SERVICE MANUAL

COLT 286

OCTOBER, 1989

PN-314118-02

Commodore

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INTERNATIONAL EDITION

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Commodore Business Machines, Inc.
1200 Wilson Drive, West Chester, Pennsylvania 19380 U.S.A.

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TABLE OF CONTENTS

SECTION 1 — SPECIFICATIONS

SECTION 2 — OPERATION NOTES

SECTION 3 — TROUBLESHOOTING GUIDE

SECTION 4 — PARTS

SECTION 5 — SCHEMATICS

TECHNICAL SPECIFICATIONS

COLT 286	**AT Compatible**
MEMORY	
ROM	Autoconfig BIOS
RAM on board	640 kbytes Base RAM
RAM expandable	
on board	n/a
on slots	Yes; to 15 Mbytes
CPU	
Type	80286-12
Clock speed	6, 8, 12 MHz
80287 Math Co-processor	Socket on board
Number of Slots	Two AT, one XT slots
Operating System	MS-DOS 3.3 included
KEYBOARD	
Number of keys	ASCII 101 — International 102
Type	Enhanced AT
Numeric keypad	Yes
Cursor keys	4 - inverted T layout
Function keys	12
POWER SUPPLY	
Type	High-efficiency switching power supply with integrated cooling fan
Maximum configuration supported	2 floppy disk drives, one hard disk drive, 3 expansion cards; or 1 floppy disk drive, one hard disk drive, 1 tape unit, 3 expansion cards
INPUT/OUTPUT PORTS	
RS232C serial	Built in
Centronics parallel	Built in
Mouse port	Built in for 1352 Mouse — Microsoft bus mouse configuration
STORAGE	
Floppy drive	Build in controller supports one or two drives
Hard drive	One AT hard disk built in
Maximum internal configuration	Two half-height 3.5 or 5.25 inch floppy disk drives and one half-height 3.5 inch hard disk drive
VIDEO	
EGA	EGA Wonder800 + video card
CGA	EGA Wonder800 + video card
MDA	EGA Wonder800 + video card
Hercules	EGA Wonder800 + video card

(See *EGA Wonder800 + User's Guide* for video details.)

COMPATIBLE MONITORS

EGA, RGB Color, TTL Monochrome, Multisync Monitors

OTHER FEATURES

Built-in real-time clock/calendar with battery backup
External Configuration switches
Hardware Reset switch
Audio connector — (1V peak-to-peak; 1 K ohm impedance) provides external audio for enhanced sound; to be connected to a monitor's pre-amp circuit.

COMMODORE ADD-ON OPTIONS

Second floppy disk drive
1352 mouse
MPS 1250 printer
1402 TTL monitor (mono)
xxxx monitor (mono) with sound
1084 RGB monitor (color) with sound

EGA WONDER800®

SPECIFICATIONS

VIDEO DISPLAY BUFFER
256K bytes

SYNC SIGNALS
Separate horizontal and vertical sync in TTL levels

Horizontal
35kHz - MultiSync monitors (800x600)
31.5kHz - MultiSync monitors (640x480)
21.8kHz - EGA monitors
15.75kHz - RGB monitors
18.432kHz - TTL Monochrome monitors

Vertical
56 Hz - MultiSync monitors (800x600)
60 Hz - MultiSync monitors (640x480)
60 Hz - EGA monitors
60 Hz - RGB monitors
50 Hz - TTL Monochrome monitors

CONNECTOR
9-pin D shell (Female) IBM standard

MONITOR COMPATIBILITY
TTL Monochrome Display
RGB Color Display
EGA Enhanced Color Display
MultiSync monitor

SIZE
5.25" x 4.2"

POWER
+5V ± 5%, @ 0.6 AMP typical

ENVIRONMENT
Ambient Temperature 50° to 122° F (10° to 50° C) operation. 32° to 162° F (0° to 70° C) storage
Relative Humidity 5% to 90% non-condensing operation. 0% to 95% storage

BUS
AT standard

BUS LOADING
No more than 2 LS TTL load

CONNECTOR SPECIFICATIONS

DB9 Connector

Pin No.	Signal
1	Ground
2	Secondary Red/Ground
3	Primary Red
4	Primary Green
5	Primary Blue
6	Secondary Green/Intensity
7	Secondary Blue/Mono Video
8	Horizontal Retrace
9	Vertical Retrace

SECTION 2

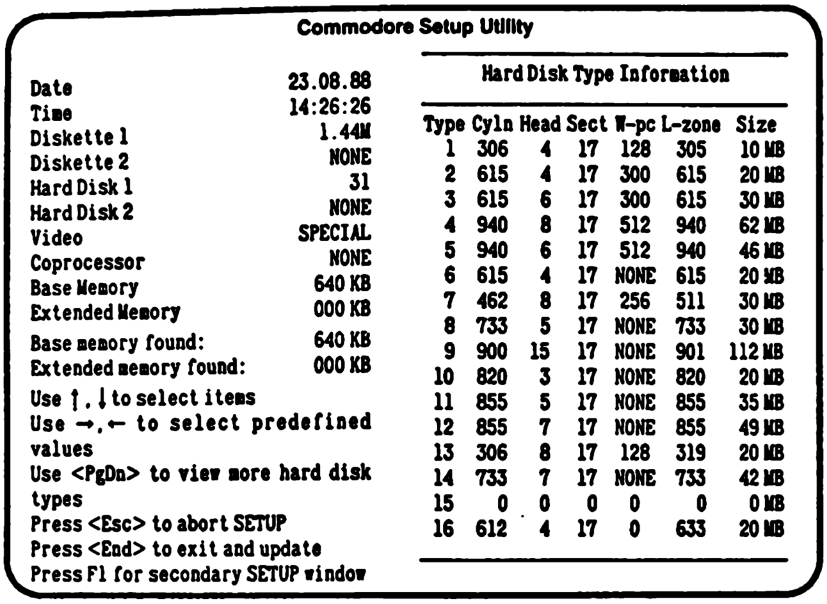
NOTES — OPERATIONS GUIDE

OPERATION NOTES

THE COLT 286 HARDWARE CONFIGURATION

USING THE COLT 286 SETUP UTILITY

Once MS-DOS has finished booting and the C> prompt has appeared, you can use the built-in Setup utility to give the system detailed information on your COLT 286 configuration. To run the Setup utility, hold down the Control and Alt keys and simultaneously press the Esc key. The main menu of the Setup utility will appear and will look like this:



```
                          Commodore Setup Utility
                                    ---------------------------------------------
                                          Hard Disk Type Information
Date                      23.08.88
Time                      14:26:26  ---------------------------------------------
Diskette 1                   1.44M  Type Cyln Head Sect W-pc L-zone  Size
Diskette 2                    NONE     1  306    4   17  128   305   10 MB
Hard Disk 1                     31     2  615    4   17  300   615   20 MB
Hard Disk 2                   NONE     3  615    6   17  300   615   30 MB
Video                      SPECIAL     4  940    8   17  512   940   62 MB
Coprocessor                   NONE     5  940    6   17  512   940   46 MB
Base Memory                 640 KB     6  615    4   17 NONE   615   20 MB
Extended Memory             000 KB     7  462    8   17  256   511   30 MB
                                       8  733    5   17 NONE   733   30 MB
Base memory found:          640 KB     9  900   15   17 NONE   901  112 MB
Extended memory found:      000 KB    10  820    3   17 NONE   820   20 MB
Use ↑.↓ to select items               11  855    5   17 NONE   855   35 MB
Use →,← to select predefined          12  855    7   17 NONE   855   49 MB
values                                13  306    8   17  128   319   20 MB
Use <PgDn> to view more hard disk     14  733    7   17 NONE   733   42 MB
types                                 15    0    0    0    0     0    0 MB
Press <Esc> to abort SETUP            16  612    4   17    0   633   20 MB
Press <End> to exit and update      ---------------------------------------------
Press F1 for secondary SETUP window
```

FIGURE 1. COMMODORE SETUP UTILITY MAIN MENU

As noted on the Setup screen, you can use the cursor keys and the keyboard to define or change the system configuration, as follows:

- ***Use the up and down cursor keys to move from option to option in the main menu.***
- ***Use the left and right cursor keys to select the predefined entries for each option.***
- ***Use the keyboard to type in any information that is not predefined.***
- ***Use PgDn to display additional hard disk types (see Figure 2).***
- ***Use the F1 key to display the secondary setup window.***
- ***Use the Esc (Escape) key to abort Setup.***
- ***Use the End key to exit Setup and update the settings.***

Following is specific information about the various Setup menu options.

Setting the Date and Time for the Real Time Clock/Calendar

The COLT 286 has a Real Time Clock/Calendar with a battery backup. This means that once set, the clock/calendar will keep the correct date and time even when the computer is turned off. You use the first two lines of the Setup Utility to set the Real Time Clock/Calendar, as follows:

Date: Allows you to set the correct date into the Real Time Clock. This option does not have any predefined entries; simply **enter the date from the keyboard, in the format *dd/mm/yy.***

Time: Allows you to set the correct time into the Real Time Clock, without invoking MS-DOS. This option also does not have any predefined entries; simply **enter the time from the keyboard, in the format *hh:mm:ss.*,** where hh = 00-23, mm = 00-59 and ss = 00-59.

Setting the Floppy Disk Drive Options

You can have a maximum of two floppy diskettes configured into your COLT 286. The next two Setup menu options, Diskette 1 and Diskette 2, allow you to tell the system how many floppy drives are available and what type they are.

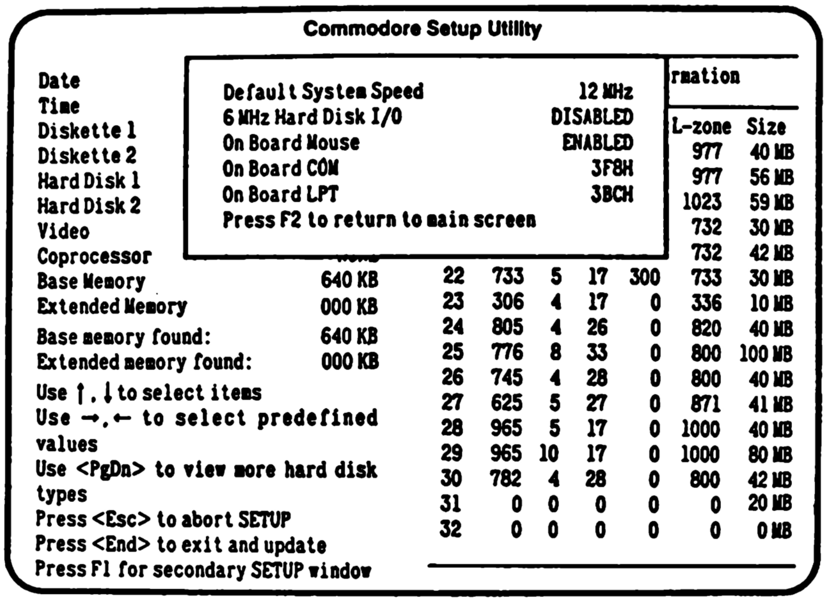
Here's how to set these options:

Diskette 1: Predefined entries: None, 360 Kb 5.25, 1.2 Mb 5.25, 720 Kb 3.5, 1.44 Mb 3.5.
The floppy drive in your COLT 286 is always considered Diskette 1. Since COLT 286 is equipped with a high density (1.44 Mb) drive, select 1.44 Mb 3.5 for Diskette 1.

Diskette 2: Predefined entries: None, 360 Kb 5.25, 1.2 Mb 5.25, 720 Kb 3.5, 1.44 Mb 3.5.
If you **have not** installed a second floppy drive in your COLT 286, select *None* for Diskette 2. If you ***have*** installed a second floppy drive, select whichever drive type (**360 Kb 5.25, 1.2 Mb 5.25, 720 Kb 3.5, 1.44 Mb 3.5**) applies to the installed drive.

Setting the Hard Disk Drive Options

Hard Disk 1 and Hard Disk 2, the next two options in the Setup utility, define how many hard disk drives are available and what kind of hard disk drives they are. Hard disk drives are identified by a pre-assigned ***Drive Type*** (1, 2, etc.). This number tells the COLT 286 the *drive manufacturer* and *capacity.*



```
                          Commodore Setup Utility

Date                  Default System Speed          12 MHz    rmation
Time                  6 MHz Hard Disk I/O         DISABLED
Diskette 1            On Board Mouse               ENABLED    L-zone  Size
Diskette 2            On Board COM                    3F8H      977   40 MB
Hard Disk 1           On Board LPT                    3BCH      977   56 MB
Hard Disk 2           Press F2 to return to main screen        1023   59 MB
Video                                                           732   30 MB
Coprocessor                                                     732   42 MB
Base Memory                   640 KB    22  733  5  17  300     733   30 MB
Extended Memory               000 KB    23  306  4  17    0     336   10 MB
Base memory found:            640 KB    24  805  4  26    0     820   40 MB
Extended memory found:        000 KB    25  776  8  33    0     800  100 MB
Use ↑,↓ to select items                 26  745  4  28    0     800   40 MB
Use →,← to select predefined            27  625  5  27    0     871   41 MB
values                                  28  965  5  17    0    1000   40 MB
Use <PgDn> to view more hard disk       29  965 10  17    0    1000   80 MB
types                                   30  782  4  28    0     800   42 MB
Press <Esc> to abort SETUP              31    0  0   0    0       0   20 MB
Press <End> to exit and update          32    0  0   0    0       0    0 MB
Press F1 for secondary SETUP window
```

FIGURE 2. SETUP UTILITY PULLDOWN MENU FOR HARD DISK DRIVE TYPE

Here's how to define your hard disk configuration:

Hard Disk 1:

Your COLT 286 comes equipped with a 20 MB hard disk drive. This drive is always considered *Hard Disk 1.* The ***Drive Type*** for this drive is shown on a sticker located on the back of your System Unit. **Find this number and type it in after *Hard Disk 1.***

The COLT 286 Setup utility includes a menu of hard disk drive types with their individual ID numbers. You can page through the menu by pressing the PgDn key. For example, the opening Setup screen in Figure 1 lists drive types 1 through 16. If you press PgDn, the Setup screen will be as shown in Figure 2 with drive types 17 through 32 listed.

Hard Disk 2: This option is not supported by the onboard controller.

Other Setup Options on the Main Setup Screen

Video: Tells system what the default video is. Factory-set default is ***special.*** This will not change even if the *EGA Wonder800 + Card* setting changes. To change the card setting, see the *EGA Wonder800 + User's Guide.*

Coprocessor: Tells system if an 80287 Numeric Coprocessor (NCP) is installed. Factory-set default is ***none***. Select Yes if you have installed an 80287 Numeric Coprocessor.

Base memory: Lets you customize base memory for specific applications.

Extended Memory: Disabled.

Using the Secondary Setup Window

Notice the popup window shown at the top of Figure 2. This menu is known as the secondary Setup window. You can access this window by pressing the F1 key. You can return to the main Setup window by pressing the F2 key.

The secondary window provides an easy way to change a number of system parameters that are set at startup by the COLT 286's AUTOCONFIG feature. The secondary Setup window values shown in Figure 2 are the default values normally present at system startup. The following list shows all the possible values for the menu items; the default values are underlined:

Default System Speed	**(6/8/12 MHz)**
6 MHz Hard Disk I/O	**(Disabled/Enabled)**
On Board Mouse	**(Enabled/Disabled)**
On Board COM	**(3F8H/2F8H/OFF)**
On Board LPT	**(3BCH/378H/278H/OFF)**

Just as with the main Setup screen menu, when you are in the secondary Setup window you can move to an item by using the up and down cursor keys, and you can set the value of the item by using the left and right cursor keys. However, you cannot use the Esc or End keys while you are in the secondary window; before you can use these keys you must first return to the main Setup screen by pressing the F2 key.

The ***Default System Speed*** item allows you to select whatever system speed best suits the particular hardware/software configuration of your COLT 286. For instance, if you are using some older software programs or if you have installed a slow speed (6 MHz) Numeric Coprocessor, these may not run at all or may be unreliable at a system speed of 12 MHz. In such cases you can simply select the 6 or 8 MHz clock speed as the Default System Speed.

Note that the ***6 MHz Hard Disk I/O*** value is normally disabled to allow for the fastest possible data transfer to and from the hard disk. You should not have to change this setting unless you are using a hard disk that cannot support high speed data transfer.

You can use the secondary Setup window to enable or disable the on board mouse and to select the serial port ***(COM)*** and the parallel port ***(LPT)***.

SETTING THE MICROPROCESSOR CLOCK SPEED

The 80286 microprocessor in the COLT 286 is capable of running at three different clock (i.e., processor or CPU) speeds:

- **Standard speed = 6 Mhz**
- **Turbo speed = 8 Mhz**
- **Double speed = 12 Mhz**

Unless you have changed the Default System Speed item in the secondary Setup window, the COLT 286 is pre-set to run to double speed (12 MHz) whenever it is booted. You can switch between the clock speeds during a session by using special key combinations or by using the ATSPEED command. (NOTE: If you reboot the COLT 286, the system speed will revert to the default speed specified in the Setup utility. You can reset the default speed by using Ctrl-Alt-Esc to access the Setup utility and then using F1 to call up the secondary Setup window.)

To set the clock speed from the keyboard, use these key sequences:

- **CTRL-ALT-S for standard speed (6 MHz)**
- **CTRL-ALT-T for turbo speed (8 MHz)**
- **CTRL-ALT-D for double speed (12 MHz)**

Note: Some software may require that you select standard or turbo speeds for normal operation.

To set the clock speed using the ATSPEED command, first make sure the MS-DOS prompt is showing on the screen. Then type the word ATSPEED, followed by a space, a dash (—), and then a letter (S, T or D) denoting the desired speed. For instance, if you are in standard speed and you want to change to turbo speed (8 MHz), type the following and press Enter:

```
ATSPEED —T
```

COLT 286 VIDEO MODES

The EGA Wonder800 + card in the COLT 286 is a high performance EGA graphics card from ATI Technologies Inc., a recognized leader in the video display card field.

Offering total flexibility, the EGA Wonder800 + can display all of the major IBM PC software and hardware standards — EGA, CGA, MDA and Hercules — on any of the major monitor types — Enhanced Graphics, RGB Color, TTL Monochrome and Multifrequency monitors. The EGA Wonder800 + is 100% hardware compatible at the BIOS and register levels.

There are no switches or jumpers to set on the EGA Wonder800 +; special software automatically configures your system at bootup. The EGA Wonder800 + software utilities, ESETUP and ECONFIG, allow the user to easily change the computer selected default video configuration.

ESETUP

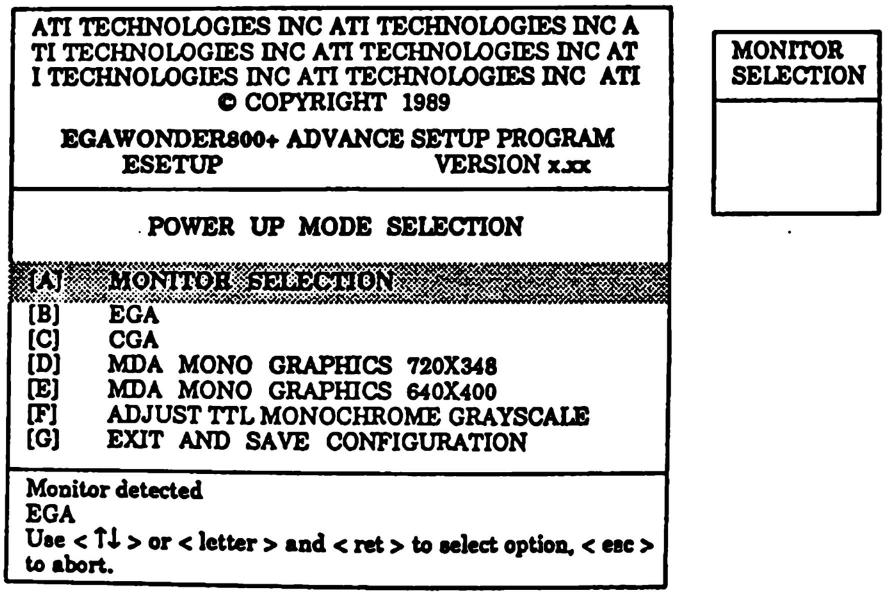
ESETUP is used to configure the onboard EEPROM. The setup information is retained even after the power is turned off. It is also used to change or store the default information used by the **EGA Wonder800 +**. It is only necessary to use **ESETUP** in the following situations:

- To change the default setup video mode.
- To specify default monitor selection on power-up.

To start **ESETUP**, type at the DOS prompt:

```
C>ESETUP<Enter>
```

A menu like the following will be displayed:



```
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            © COPYRIGHT  1989
  EGAWONDER800+ ADVANCE SETUP PROGRAM
      ESETUP                  VERSION x.xx

          POWER UP MODE SELECTION

[A]    MONITOR SELECTION
[B]    EGA
[C]    CGA
[D]    MDA  MONO  GRAPHICS  720X348
[E]    MDA  MONO  GRAPHICS  640X400
[F]    ADJUST TTL MONOCHROME GRAYSCALE
[G]    EXIT  AND  SAVE  CONFIGURATION

Monitor detected
EGA
Use < ↑↓ > or < letter > and < ret > to select option, < esc >
to abort.
```

NOTE: Because of ongoing product improvements, EGA Wonder800 + menus and features may not be exactly as shown. See the *EGA Wonder 800 + User's Guide* and the software README files for the most current information.

The options in the ESETUP menu can be selected by typing in the letter to the left of the selection and then pressing the Enter key. For a full description of the ESETUP software, including the individual options, see the *EGA Wonder800 + User's Guide.*

ECONFIG

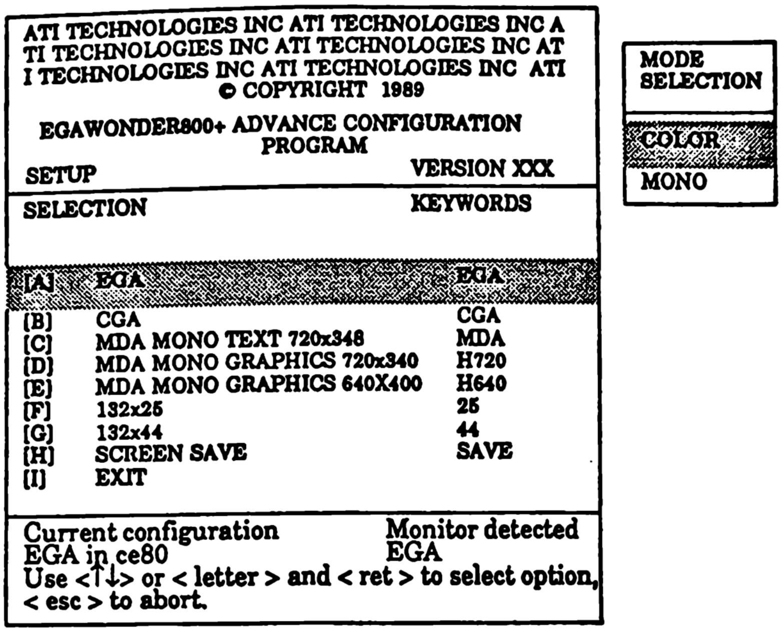
ECONFIG is a manu-driven used to:

- Change the current video mode to a different mode.
- Automatically turn your screen display off during long periods of inactivity.

ECONFIG is available on your hard disk drive and on one of the EGA Wonder800 + software diskettes.

To start **ECONFIG**, type at the DOS prompt:

C>ECONFIG<enter>



```
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             © COPYRIGHT  1989

 EGAWONDER800+ ADVANCE CONFIGURATION
              PROGRAM
SETUP                          VERSION XXX
SELECTION                      KEYWORDS

[A]    EGA                          EGA
[B]    CGA                          CGA
[C]    MDA MONO TEXT 720x348        MDA
[D]    MDA MONO GRAPHICS 720x340    H720
[E]    MDA MONO GRAPHICS 640X400    H640
[F]    132x25                       25
[G]    132x44                       44
[H]    SCREEN SAVE                  SAVE
[I]    EXIT

Current configuration          Monitor detected
EGA in ce80                    EGA
Use <↑↓> or < letter > and < ret > to select option,
< esc > to abort.
```

```
MODE
SELECTION

COLOR
MONO
```

As with **ESETUP**, each of the options in **ECONFIG** can be selected by typing in the letter to the left of the selection and then depressing the Enter key. As you get familiar with the operation of **ECONFIG**, you can bypass the menu completely by typing:

C>ECONFIG[KEYWORD]<Enter>

The keywords are indicated on the right hand side of the screen: EGA, CGA, MDA, H720, H640, 25, 44 or SAVE.

For a full description of the **ECONFIG** software and options, see the EGA Wonder800 + User's Guide.

AUTOCONFIG™

AUTOCONFIGuration is a unique feature of the Commodore PC personal computers like the COLT 286, allowing the computer to automatically sense additional peripheral devices plugged into the expansion bus. Once these additional devices are detected, the resident peripherals on the COLT 286 motherboard are adjusted so as not to conflict with expansion peripherals. The AUTOCONFIG™ feature can prevent hardware damage to peripherals and motherboard, as well as ease the installation of expansion cards.

VIDEO

The video configuration process for the COLT 286 is handled by the EGA Wonder800 + video system. See the *EGA Wonder800 + User's Guide* for full details on the COLT 286 video configuration.

Serial Port (COMn:)

Before the onboard serial port is enabled a scan of the two standard COMn: hardware locations is made. If serial hardware (serial card/modem) is found operational, possible bootup message(s) may be:

EXPANSION COM at 03F8h

and/or

EXPANSION COM at 02F8h

If both available COM: addresses are occupied by expansion boards, then the onbard serial port will not be enabled. The onboard serial port will be configured and tested at I/O address 03F8h if no expansion COM:'s are found and will be configured and tested to the unused COM: address if only one expansion COM: is found.

If the onboard serial port is configured and tested successfully a message will be output during bootup:

ONBOARD COM at 03F8h

or

ONBOARD COM at 02F8h

Parallel Port (LPTn: or PRN:)

Before the onboard parallel port is enabled, a scan of the three standard LPTn: hardware locations is made. If parallel hardware (e.g., a printer card) is found operational, possible bootup message(s) may be:

EXPANSION LPT at 0378h
and/or
EXPANSION LPT at 0278h
and/or
EXPANSION LPT at 03BCh

If all available LPT: addresses are occupied by expansion boards, then the onboard parallel port will not be enabled. The onboard parallel port will be configured and tested at I/O address 03BCh if no expansion LPT:'s are found and will be configured and tested to the unused LPT: address if two expansion LPT:'s are found. If only one expansion LPT: is found, the onboard parallel port will be enabled to the first available I/O address when searching in the following sequence:

03BCh, 0378h, 0278h

If the onboard parallel port is configured and tested successfully, a message will be output during bootup:

ONBOARD LPT at 03BCh
or
ONBOARD LPT at 0378h
or
ONBOARD LPT at 0278h

Mouse Port

A check is made for a standard Microsoft Bus Mouse. If it is found in the I/O channel then the onboard Microsoft compatible mouse hardware is never enabled. The following message will appear during bootup:

EXPANSION MOUSE at 023Ch

If no expansion mouse is found the onboard mouse is enabled and tested. If the mouse is operational then the following message will appear during bootup:

ONBOARD MOUSE at 023Ch

NOTE: The onboard Mouse hardware is enabled/tested independent of the presence of the actual mouse. The bootup messages will appear even if the Commodore PC Mouse Kit is not attached.

80287 Numeric Coprocessor

A test is made for the presence of an 80287 Numeric Coprocessor during bootup. If an 80287 is detected the following message will be output:

80287 Numeric Coprocessor

USING AN 80287 NUMERIC COPROCESSOR

The Commodore COLT 286 personal computer comes equipped with a 40-pin socket (U302) for installation of an 80287 Numeric Coprocessor (NCP). When used with software or drivers designed to make use of its abilities, the NCP enhances the COLT 286's ability to process floating point mathematics, integer math and trancendental functions. Many language compilers (e.g., "C") have libraries available that support the use of an NCP.

80287 NCPs are available in the following speeds: 5, 6, 8 and 10 MHz. **The units are downwardly compatible only!** This means that a 10 MHz part will function properly if your COLT 286 is running at 6 or 8 MHz, but a 6 MHz part will NOT function at 12 MHz. As a rule the higher the speed of an NCP, the more expensive and harder to find that NCP will be. The 8 MHz 80287s are most readily available and are reasonably priced.

To operate your COLT 286 at clock speeds of 6, 8 and 12 MHz with an NCP, an 80287-8 or 80287-10 is required.

INSTALLING THE OPTIONAL COMMODORE 910, 915 AND 920 FLOPPY DRIVES

In addition to following the general installation instructions given in the manuals for the Commodore 910 and 920 floppy drives, the user must also perform the specific procedures for COLT 286 installation described below.

Commodore 910 Floppy Drive

To install the Commodore 910 3.5 inch 720Kb drive as Drive B: in the COLT 286, the user must do the following:

- Set the drive select jumper to position 1.
- The M jumper should be in position 5.
- The R-D jumper should be in position 6.
- The first time you power up, use the Setup utility to identify your second drive (Diskette 2 on the menu) as a **720Kb 3.5** drive.

Commodore 920 Floppy Drive

To install the Commodore 920 5.25 inch 360Kb floppy drive as Drive B: in the COLT 286, the user must do the following:

- Set the drive select jumper to position 1.
- Cut JP6 (located on the bottom side of JP1) in half.
- The first time you power up, use the Setup utility to identify your second drive (Diskette 2 on the menu) as a **360Kb 5.25 drive.**

Commodore 915 Floppy Drive

No special procedures are required to install the Commodore 915 3.5 inch 1.44 Mb as Drive B:; just follow the instructions in the manual. The first time you power up, use the Setup utility to identify your second drive (Diskette 2 on the menu) as a **1.44Mb, 3.5** drive.

USING 720 KB FLOPPY DISKS ON THE COLT 286 SYSTEM

The floppy disk drive (Drive A:) is designed to make full use of 3.5 inch, double-sided high-density disks (DS/HD disks), which can be formatted to store ukp to 1.44 MB of information. This drive can also read and write the 3.5 inch, double-sided double-density disks (DS/DD disks), which can be formatted to store 720 KB of information.

USING THE SINGLE FLOPPY DRIVE AS TWO DRIVES

Even though the standard COLT 286 configuration includes only one floppy disk drive, you can still type MS-DOS commands as if you had two floppy drives in the system. Just think of the single drive as being two drives — Drive A: and Drive B:. However, instead of *A:* and *B:* representing physical drives, they represent *disks.*

SPECIAL KEYBOARDS

The COLT 286 MS-DOS software allows you to select any of the following keyboards, in addition to the U.S. keyboard. Just type the appropriate KEYB xx command at the MS-DOS prompt and press ENTER. In KEYB xx, xx is one of the following two-letter codes:

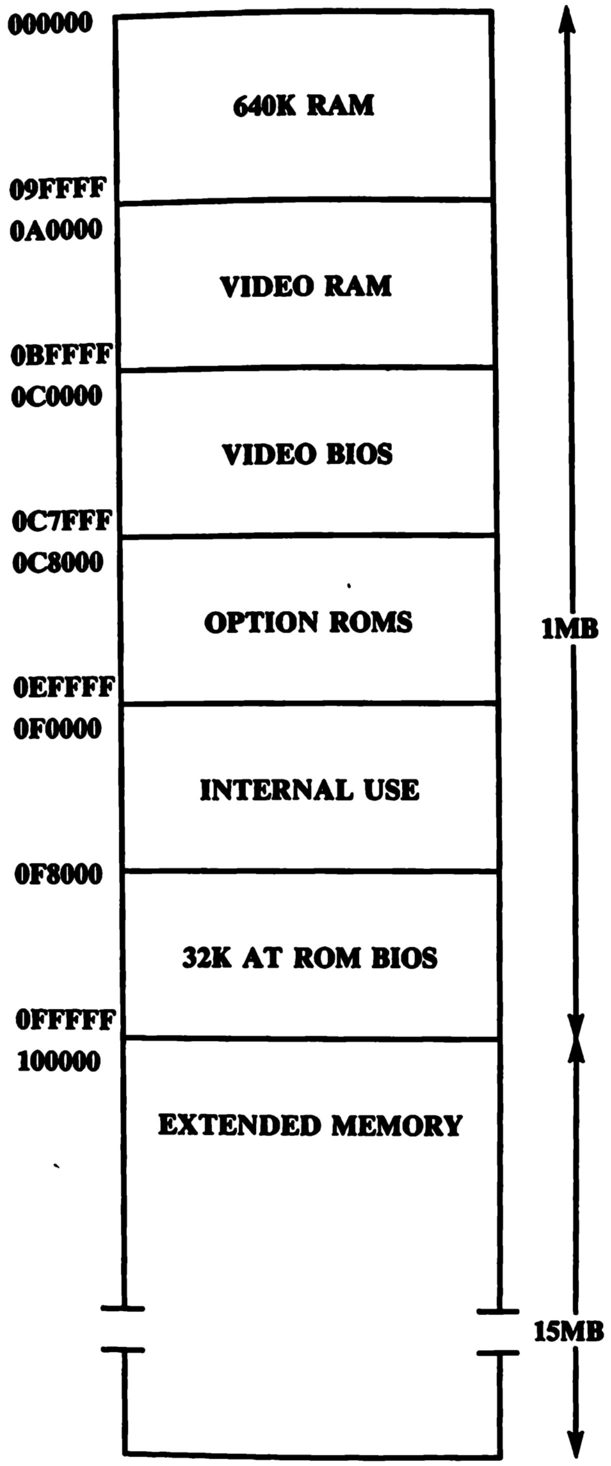
Code	*Keyboard*	*Command*
DV	*Dvorak*	*keyb dv*
FR	*France*	*keyb fr*
GR	*Germany*	*keyb gr*
IT	*Italy*	*keyb it*
SP	*Spain*	*keyb sp*
UK	*United Kingdom*	*keyb uk*

You should load only one keyboard program after starting MS-DOS. You can switch from the KEYB program to the default (United States) keyboard format at any time by pressing CTRL-ALT-F1. You can then return to the memory-resident keyboard program by pressing CTRL-ALT-F2.

If you include the appropriate KEYB command in your AUTOEXEC.BAT file, the correct keyboard assignment will be made automatically whenever you boot MS-DOS.

For More Information About the Keyboard. . .

For more information about using the COLT 286's keyboard, see the KEYB command description in the *MS-DOS Commands* chapter of the *MS-DOS User's Reference.* Also see the user's manuals for your software programs.



COLT 286 MEMORY MAP

SECTION 3

TROUBLESHOOTING GUIDE

TECHNICAL SERVICE NOTES

WARNING: **COLT 286 PRINTED CIRCUIT BOARD CONTAINS CMOS CIRCUITRY, USE STATIC PRECAUTIONS WHEN HANDLING OR SERVICING THIS PRODUCT.**

IMPORTANT:

- **COLT 286 PCB'S RETURNED FOR CREDIT MUST BE SHIPPED IN AN ANTI-STATIC BAG, AVAILABLE THROUGH THE COMMODORE PARTS DEPT. ANY PCBS RETURNED FOR CREDIT BY SERVICE CENTERS WHICH ARE NOT PACKAGED CORRECTLY WILL BE SENT BACK TO THE SERVICE CENTER AND NO CREDIT WILL BE ISSUED.**
- **COLT 286 HARD DRIVES RETURNED FOR CREDIT MUST BE INSERTED IN AN ANTI-STATIC BAG AND PACKED IN A COMMODORE SPECIFIED HIGH DENSITY FOAM SHIPPING BOX, BOTH AVAILABLE THROUGH THE PARTS DEPT. FAILURE TO DO SO WILL VOID WARRANTY.**

COMPONENT REPAIR:

COLT 286 MAIN BOARD IS A MULTI-LAYERED PCB ASSEMBLY. COMPONENT REPAIR BEYOND THE SOCKETTED CHIP LEVEL RESULTING IN NON-REPAIRABLE DAMAGE WILL VOID WARRANTY. USE STATIC PRECAUTIONS WHEN SERVICING THIS PCB ASSEMBLY.

TROUBLESHOOTING ERROR MESSAGES

Troubleshooting Guide

Error Messages	Customer Response	Service POD Test (H)
1. DMA 1 error	See your dealer	Test 0B
2. DMA 2 error	See your dealer	Test 0C
3. Interrupt controller 1 error	See your dealer	Test 0D
4. Interrupt controller 2 error	See your dealer	Test 0E
5. PIO error	See your dealer	Test 0F
6. Parity error	See your dealer	Test 10
7. Real time clock is not working	See your dealer	Test 1E
8. Illegal shutdown code in CMOS	See your dealer	Test 02
9. Virtual Mode CPU error	See your dealer	Test 26
10. Parity error on main circuit board	See your dealer	Misc
11. Parity error on expansion bus	See your dealer	Misc
12. Non-recoverable error-Processor halted	See your dealer	Misc
13. Press F1 key to continue	Press F1 key	Misc
14. Battery Failure	Run Setup Utility/See your dealer	Test 11
15. Base memory configuration error	Run Setup Utility	Test 17
16. Extended memory configuration error	Run Setup Utility	Test 18
17. Floppy 0 configuration error	Run Setup Utility	Test 1A
18. Floppy 1 configuration error	Run Setup Utility	Test 1A
19. Coprocessor (80287) configuration error	Run Setup Utility	Test 1D
20. The realtime clock has not been initialized	Run Setup Utility	Test 1E
21. Keyboard	Check keyboard	Test 14
22. Key switch is off. Turn it on to continue	Turn keylock on	
23. Boot failure, check disk and hit any key to try again	Check for non-MS-DOS disk in Drive A:; run Setup Utility	Misc

POWER ON DIAGNOSTICS

COLT 286 Trouble Shooting — Section 3

The Commodore 80286 ROM bios contains a "Power on Diagnostic" program which tests the functions of hardware and checks the configuration prior to passing control to the operating system.

The number of the test routine being run is passed to addr 03 78 (H) prior to the start of each test section.

The 80286 processor is initialized by the "RESET" signal. Refer to RESET description in IC pinout section, note that "VCC" and "CLK" to CPU must be correct and "HOLD" must not be active for 34 ticks from leading edge to trailing edge of initial reset.

RESET will terminate all instruction execution and local bus activity until it is negated. Prior to fetching, decoding and executing, the first instruction, located at physical address FF FF F0 (H), the 80286, in real address mode, processes some micro code located in its internal ROM, this takes about 38 ticks.

Test 01 (H) 0000 0001 (B)

The first test performed by the power on diagnostic checks the 8088 flags, the arithmetic logical unit, and the CPU registers.

If a failure is detected in Test 01, a "HALT" instruction is executed. This will stop program execution and prevent the CPU from using the local bus. The 80286 can be forced out of the halted state by "RESET", "NMI" or "INTR" (when "INTR" is used for RESTART, the interrupt enable bit of flag register must be on (set to 1), and the effective address computed from CS:IP will point to the next instruction after the halt instruction).

***Failure in test 01 indicates defective 80286.

Test 02 (H) 0000 0010 (B)

This routine checks to see if a "SHUTDOWN" has occurred. A shutdown can indicate a severe error which would prevent the CPU from further processing.

NOTE: A halt or shutdown condition is signaled externally, by the 80286 as a bus operation. Low states on S0', S1', COD/INTA', and a high state on M/IO' indicate a halt or shutdown. The state of address line 1 will indicate which condition, A1 high is halt, A1 low is shutdown.

After the test number is moved to the parallel port a check for keyboard reset is conducted and the program branches to test 04 (H) if it has.

The check for shutdown begins by examining the 8242 keyboard controller status port. In all ten shutdown conditions are tested, of these, three unexpected shutdown conditions, numbers 6, 7 or 8, any one of which if true, will generate the console message:

"Illegal Shutdown Code in CMOS"

NOTE: Branch information for shutdown routines are stored in CMOS memory. The shutdown command is sent to the 8242, the UPI status port, which will halt the CPU. Return depends on the shutdown code in CMOS memory.

An error code, F6, F7 or F8, (HEX) is sent to the parallel port before calling the display routine which generates the above message.

In real address mode a shutdown could occur under the following conditions:

Interrupt number 8, interrupt number 13, or a "CALL INT" or "PUSH" instruction which wraps stack segment when SP is ODD.

Routines also perform valid shutdowns to exit protected mode. During these the DMA page register will be initialized and interrupt control words (ICW) 1, 2, 3 and 4 will be reinitialized. Other routines within the test enable "NMI", parity and set the I/O check bit.

***Failures in test 02 could indicate problems on the local bus, or expansion bus. This would include: 80286, FE3000, FE3010, or any third party cards.

Test 03 (H) 0000 0011 (B)

Eprom checksum test verifies contents of eprom by adding bytes and checking for result of zero. A compensation byte is factored into the addition to make the sum zero.

Detection of an error results in a halt condition and would invalidate tests 01 and 02.

***Failure in test 03 indicates defective ROM.

Test 04 (H) 0000 0100 (B)

Test 04 checks the DMA page registers by writing and reading bits starting at address 80 (H).

***Failure in test 04 indicates possible defective FE3010, or local bus.

Test 05 (H) 0000 0101 (B)

Timer 1 and timer 2 are checked for correct operation. Interrupts are masked off during the test.

***Failure in test 5 indicates possible defective FE3010.

Test 06 (H) 0000 0110 (B)

Memory refresh test. Timer and DMA are setup to initiate refresh cycles every 15.1 microseconds. Size of virual memory is calculated.

***Failure in test 06 indicates possible FE3010, Refresh logic or memory problem.

Test 07 (H) 0000 0111 (B)

Test 07 checks the 8242 keyboard controller by writing and reading the keyboard buffers.

***Failure in test 07 indicates possible defective 8242 or associated circuitry.

Test 08 (H) 0000 1000 (B)

Test 08 writes and reads the first 128K of RAM and verifies block size is 128K. First pass writes addresses into data, the second pass writes the complement of the address into data. Memory is cleared after test. The battery status is also confirmed in test 08.

***Failure in test 08 indicates possible defective RAM or RAM logic.

Test 09 (H) 0000 1001 (B)

Test and configure video. A search is made to determine if MDA, CGA or a special video adapter is configured, if not the onboard VGA is enabled and a call to VGA bios is executed. The dip switches are read to determine the default video mode.

NOTE: The mode register setting in the 5720 controls the reset signal to the onboard VGA controller chip. If no special video adapters are found on the expansion bus then "NOVID" from the 5720 to the PVGA is negated.

On completion of this test the title and copyright message are displayed.

Test 0A (H) 0000 1010 (B)

Test RAM from 128K to 640K. A display message is generated indicating that the base RAM of 128K, Test 08, is OK.

Blocks of 128K, starting at 128K are then tested by writing, reading and verifying RAM. The first pass writes addresses to data, that is, the address which defines the physical location is also used as the bit pattern that is being written. The second pass writes complement of address into data.

The test displays results in blocks of 128K to the console each time a 128K boundary is reached.

At completion of the onboard memory test the CPU is placed in virual mode and a test for virtual memory (over 1 MEG) is started.

NOTE: See test 26 (H).

***Failure in test 0A indicates a defective RAM.

Test 0B (H) 0000 1011 (B)

DMA controller #1 register check.

NOTE: Error messages beginning with this test appear in the COLT 286 Operators Guide.

Four current address registers (16 bits wide, each) and four current word count registers (16 bits wide, each) for each of the four DMA channels are written to and read from to verify operation.

A failure in test 0B will generate the following display on the console:

"DMA 1 error"

The beeper will sound, and a halt instruction will be executed.

***Failure in test 0B indicates A defective FE3010.

Test 0C (H) 0000 1100 (B)

DMA controller #2 register check. The second functional 8237 containing four current address registers (16 bits wide, each) and four current word count registers (16 bits wide, each) within the FE3010 are written to and read from to verify operation.

Successful completion of the test 0C will set the modes for DMA channels 0 through 3 and enable cascading by channels 4, 5 and 6 (DMA 1).

A failure in test 0C will generate the following display on the console:

"DMA 2 error"

The beeper will sound, and a halt instruction will be executed.

***Failure in test 0C indicates a defective FE3010.

Test 0D (H) 0000 1101 (B)

Interrupt controller #1 test. Patterns are written to, and read from the interrupt mask register (IMR) which controls the interrupt request register (IRR).

A verification is made that no interrupts can occur if "IMR" is set to FF (H). A vector is initialized to a temporary interrupt service routine in the event of a failure.

A test for correct timer 0 interrupt is also made.

A failure in test 0D will generate the following display on the console:

"Interrupt controller 1 error"

The beeper will sound, and a halt instruction will be executed.

***A failure in test 0D indicates a defective FE3010.

Test 0E (H) 0000 1110 (B)

Interrupt controller #2 test. The second functional 8259 contained in the FE3010 is tested as in test 0D, without timer test.

A failure in test 0E will generate the following display on the console:

"Interrupt controller 2 error"

The beeper will sound, and a halt instruction will be executed.

***A failure in test 0E indicates a defective FE3010.

Test 0F (H) 0000 1111 (B)

Check peripheral in/out register. Write and read from PIO register.

A failure in test 0F will generate the following display on the console:

"PIO error"

The beeper will sound, and a halt instruction will be executed.

***A failure in test 0F indicates a defective FE3010.

Test 10 (H) 0001 0000 (B)

RAM parity test. Blocks of RAM are written to and read from, parity check for odd parity is made. Parity disabled after successful test.

NOTE: COLT 286 does not use parity, third parity boards that use parity will enable parity.

"NMI" is enabled and a service routine for a parity error generates the following console message.

"Parity error"

The beeper will sound, and a halt instruction will be executed.

***Failure in test 10 indicates a defective RAM, third party card, NMI, or local bus.

Test 11 (H) 0001 0001 (B)

Test CMOS clock for battery failure and checksum failure.

Beeper will sound if failure is detected. Console will display:

"Battery failure" or "CMOS checksum failure" or both.

***Failure of test 11 indicates a defective battery, defective oscillator, or M146818A.

Test 12 (H) 0001 0010 (B)

This test is disabled. It is used only in manufacturing tests.

The beeper will sound for a set length prior to the start of test 13 (H). In a system which has passed all tests to this point the beeper sound heard now would be the one heard in the power up routine.

Test 13 (H) 0001 0011 (B)

Setup interrupt controller and move vector tables to RAM. Vector addresses are fetched from top 8K module.

NOTE: Vectors for video were setup in test 09.

Master and slave interrupts are enabled at this point.

Test 13 does not create any error messages.

Test 14 (H) 0001 0100 (B)

Keyboard test. Functional test of the 8242 keyboard controller at U203. A test for a stuck key on keyboard is performed. Check is made to see if key lock is locked.

A failure in test 14 will display the following error message on console:

"Keyboard error"

***Error indicates a defective 8242 controller or a defective keyboard.

Test 15 (H) 0001 0101 (B)

Test and configure the parallel port. Parallel port addresses are setup, reads and writes to ports are done. Set time out.

No error messages are generated by this test.

NOTE: PPC1 at U602 controls parallel output.

Test 16 (H) 0001 0110 (B)

Configure serial COM1 and COM2 for 8250 at U604. Read serial interrupt ID, set number of serial channels.

No error messages are generated by this test.

Test 17 (H) 0001 0111 (B)

Configure memory less than 640K. Parity (for EXPANSION RAM) is enabled.

Memory was tested in test 0A, and "CMOS STATUS" set. A check for a warm boot (ALT/CNTRL/DEL) is made and a comparison of the old and new memory configuration is performed. If a memory size mismatch is detected, the beeper will sound and the following non-fatal error message will be displayed on the console:

"Base memory configuration error"

The new configuration is stored.

***Check the settings for RAM size in the setup utility if you encounter this message.

Test 18 (H) 0001 1000 (B)

Configure memory over 1 megabyte (virtual memory). Check is made on address line 20, a low indicates virtual address mode.

CMOS status is checked as in test 17, a memory size mismatch will sound the beeper and generate the following non-fatal error message on the console:

"Extended memory configuration error"

The new configuration is stored.

***Check the settings for RAM size in the setup utility if you encounter this message.

Test 19 (H) 0001 1001 (B)

Configure keyboard test. Setup keyboard buffers, enable keyboard interrupt and test if key switch is turned to the on position.

If the key switch is off the following message will be displayed on the console:

"Key switch is off. Turn it on to continue."

NOTE: You are in a loop until you turn on the key switch.

Test 1A (H) 0001 1010 (B)

Configure the floppy disk drive. Calculate number of floppy drives present. Check drive type, compare settings stored in CMOS, if a mismatch the following message will be displayed on console:

"Floppy 0 configuration error"

***Check settings in setup utility if above message is displayed.

Test checks second floppy configuration, if a mismatch the following message will be displayed on the console:

"Floppy 1 configuration error"

***Check settings in setup utility if above message is displayed.

New configuration is stored in CMOS. Floppy interrupt is enabled.

NOTE: Refer to installation instructions when adding a second floppy to the system. It may be necessary to change jumpers on drive for proper operation.

Test 1B (H) 0001 1011 (B)

Configure the hard drive. Check configuration if a mismatch hard drive will not be setup.

No error message is generated.

Test 1C (H) 0001 1100 (B)

Test number is not moved to parallel port for this configuration. This routine only turns on the game card bit in the "EQUIP FLAG".

No error message is generated.

Test 1D (H) 0001 1101 (B)

Configure 80287 coprocessor. Check if 80287 is present. Enable 80287 interrupt and set "EQUIP FLAG" if it is.

Compare configuration with CMOS, store new configuration, beep the speaker, and display the following message is setup changed.

"-- Coprocessor (80287) configuration error"

***Check setup utility for correct settings if this message is displayed.

Test 1E (H) 0001 1110 (B)

Check CMOS clock to see if it was initialized and is working. Enable timer interrupt. Sound beeper, and initialize if failure detected, then display one of the following messages on the console:

"-- The Real Time Clock has not been initialized"

OR: "-- Real Time Clock error"

***Check the RTC chip, M146818A at U201 if second message above is displayed.

Test 1F (H) 0001 1111 (B)

Generate a new CMS checksum and save it in CMOS RAM. Call made to auto configuration program at this point.

No error message generated.

Test 20 (H) Not Implemented

Test 21 (H) 0010 0001 (B)

Initialize ROM drivers, including hard drive. Checksum generated, and all ROMS tested.

System will now begin boot up.

System speed is determined, 6 MHz, 8MHz or 12MHz.

***Refer to operations manual for opening screen display.

Tests 22, 23 Not Implemented

Test 24 (H) 0010 0100 (B)

Test operation of the RTC chip. Recheck battery, make sure clock is counting, test memory.

System will execute a halt instruction on memory failure. No error message is generated.

Test 25 (H) 0010 0101 (B)

Used in manufacturing to loop through diagnostics.

Test 26 (H) 0010 0110 (B)

Virutal memory test (over 1 megabyte). Call made to this routine from test 09.

Display Message: "Testing Extended RAM"
Display Message: "Total System RAM = XXXX" at finish.

During this test the exception interrupt vector tables and descriptor tables are built, and moved from ROM to RAM.

A test of address line 20 is made (controls real or virtual CPU mode). If not in virtual mode display following message:

"Test _ 26: Virtual Mode CPU error"

And send F3 (H) (1111 0011 to parallel port. Then execute a halt instruction.

Test address lines 19 through 23 are tested. Shutdown if error. Exception interrupt codes are moved to the parallel port prior to shutdown. The following list defines the code sent to the port and the type of exception interupt (EXECP INT).

81	(H)	EXECP INT 01	Single Step
82	(H)	EXECP INT 02	NMI
83	(H)	EXECP INT 03	Breakpoint
84	(H)	EXECP INT 04	Into Detect
85	(H)	EXECP INT 05	Boundary
86	(H)	EXECP INT 06	Invalid OP Code
87	(H)	EXECP INT 07	—
88	(H)	EXECP INT 08	Double Exception
89	(H)	EXECP INT 09	Processor Segment Error
8A	(H)	EXECP INT 10	—
8B	(H)	EXECP INT 11	Segment Not Present
8C	(H)	EXECP INT 12	Stack Segment Not Present
8D	(H)	EXECP INT 13	General Protection Error
8E	(H)	EXECP INT 14	—
8F	(H)	EXECP INT 15	—
90	(H)	EXECP INT 16	Processor Extension Error

Power on diagnostic program is finished at the time of boot up (end of test 21).

Note that during execution of "POD" calls are made to auto configure and to miscellaneous interrupt routines.

All error messages are listed in the COLT 286 Operators Guide.

10 "Parity error on main circuit board"
11 "Parity error on expansion bus"
12 "Non-recoverable error - Processor halted"
13 "Press F1 key to continue"

Messages 10, 11 are generated after a parity error has been detected and a memory check has determined that it was on the main board, or the expansion bus. If the check finds the error the CPU is halted and message 12 is displayed. If no error is found after the check, message 13 is displayed and processing will continue.

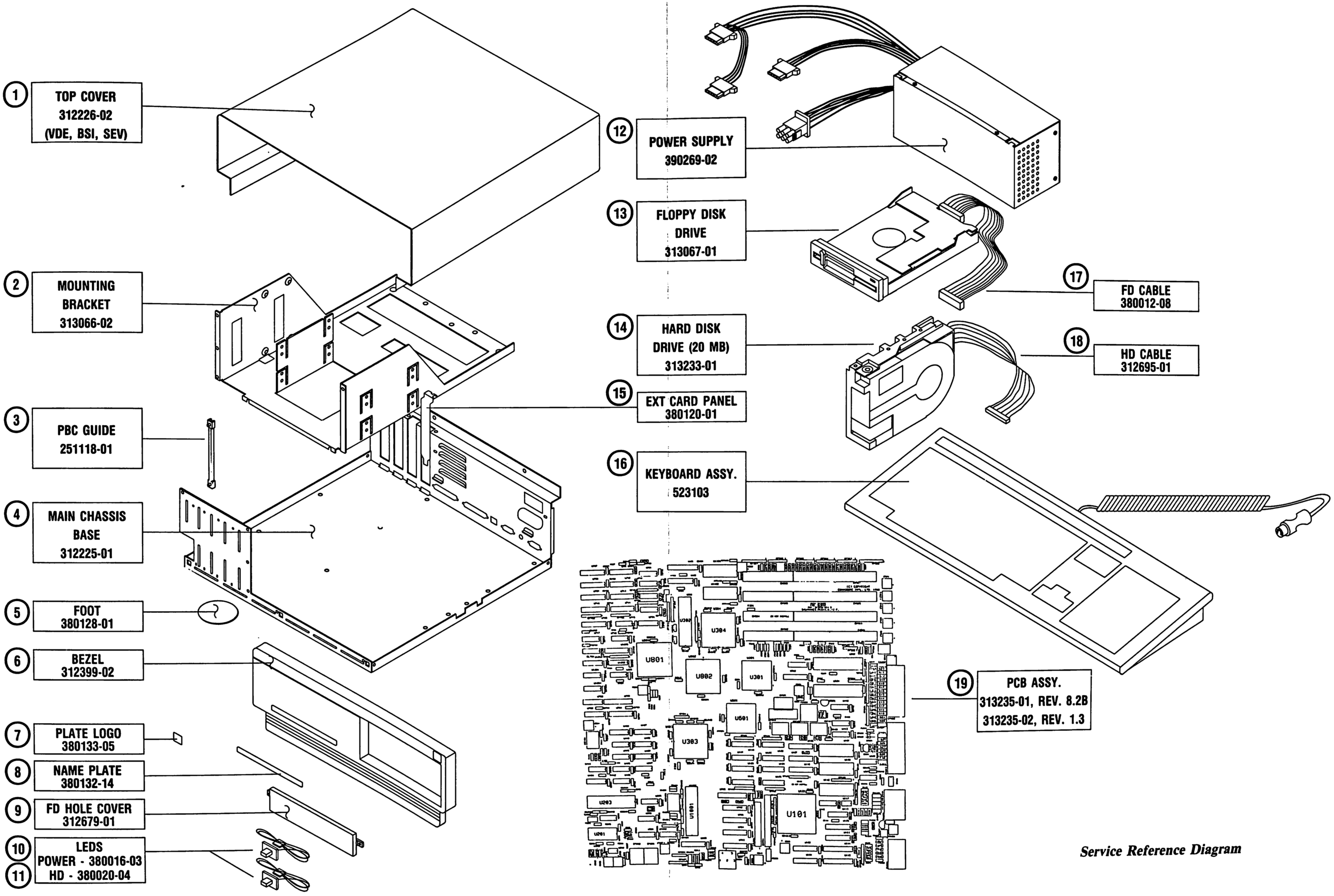
SECTION 4

PARTS SECTION

COLT 286 MAJOR PARTS LIST

Refer to Service Reference Diagram

1.	Top Cover	312226-02 (VDE, BSI, SEV)
2.	Mounting Bracket	313066-02 Sub:-01
3.	PBC Guide	251118-01
4.	Main Chassis Base	312225-01
5.	Foot	380128-01
6.	Bezel	312399-02
7.	Plate Logo	380133-05
8.	Name Plate	380132-14
9.	FD Hole Cover	312679-01
10.	LED Power On	380016-03
11.	LED Hard Drive	380020-04
12.	Power Supply Assy.	390269-02
13.	Floppy Disk Drive 1.44mb	313067-01
14.	Hard Disk Drive 20mb	313233-01
15.	Extension Card Panel	380120-01
16.	Keyboard Assy.	523103
17.	Floppy Drive Cable	380012-08
18.	Hard Drive Cable	312695-01
19.	PCB Assy.	313235-01/-02
	Ground Cable (HD)	380811-01 (Not shown)
	Power Cord	(Not shown)
	EGA Card	380069-01 (Not shown)
	Standoff	312689-02 (Not shown)
	Hex Standoff	390266-05 (Not shown)
	Standoff 'D' Conn.	390251-01 (Not shown)
	Standoff Video 'D' Conn.	(Not shown)


① TOP COVER 312226-02 (VDE, BSI, SEV)
② MOUNTING BRACKET 313066-02
③ PBC GUIDE 251118-01
④ MAIN CHASSIS BASE 312225-01
⑤ FOOT 380128-01
⑥ BEZEL 312399-02
⑦ PLATE LOGO 380133-05
⑧ NAME PLATE 380132-14
⑨ FD HOLE COVER 312679-01
⑩ ⑪ LEDS POWER - 380016-03 HD - 380020-04
⑫ POWER SUPPLY 390269-02
⑬ FLOPPY DISK DRIVE 313067-01
⑭ HARD DISK DRIVE (20 MB) 313233-01
⑮ EXT CARD PANEL 380120-01
⑯ KEYBOARD ASSY. 523103
⑰ FD CABLE 380012-08
⑱ HD CABLE 312695-01
⑲ PCB ASSY. 313235-01, REV. 8.2B 313235-02, REV. 1.3
U801
U802
U301
U304
U302
U501
U303
U101
U203
U201
U1001

Service Reference Diagram

COMPONENT PARTS LIST
PCB ASSEMBLY #313235-01

Commodore part numbers are provided for reference only and do not indicate the availability of parts from Commodore. Industry standard parts (Resistors, Capacitors, Connectors) should be secured locally. Approved cross-references for TTL chips, Transistors, etc. are available in manual form through the Service Department, order #314000-01.

IC COMPONENTS		
390300-04	80286 12 MHZ PROCESSOR	U301
309316-01	FE3000A	U801
390317-01	FE3010A	U802
390319-01	FE3020	U303
390318-01	FE3030	U304
318091-01	PPC1, PRINTER INTERFACE	U602
390304-03	WD37C65, FLOPPY CONTROLLER	U1001
380205-01	8250, SERIAL INTERFACE	U604
390417-01	DS1287 RTC/CMOS RAM	U201
390580-01	P8242 KEYBRD CONTROL	U203
318087-01	MOS 5720, MOUSE-I/O CONTROL	U601
390308-01	PAL20L10 I/O DECODER	U401
390336-02	PAL20L10 HDC DECODER	U905
390309-02	PAL16L8 DRAM DECODER	U706
318099-02	DRAM, 256 X 4 (1 MEG BIT DRAM) @ 100NS	U707-U714
390339-02	EPROM3, PC40 III BIOS - LOW (21728-12)	U1101
390342-03	EPROM4, PC40-III BIOS - HIGH (27128-12)	U1102
901521-02	74LS04	U206
901521-30	74LS14	U501
901521-20	74LS125A	U205,U414
901521-63	74LS174	U113
901521-13	74LS244	U901,U902
901521-46	74LS245	U502,U603
318066-01	74F00	U415,U720,U721,U807
390110-01	74F04	U413,U715,
390203-01	74F08	U409,U718,U719,U1201
390313-01	74F10	U717
390279-01	74F20	U1204
390077-01	74F32	U305,U416
390080-01	74F138	U803,U1202
390611-01	74F153	U403
390312-01	74F175	U404
390109-01	74F240	U704
390314-01	74F253	U701
390315-01	74F258	U702,U703
390578-01	74F573	U705,U1205
390198-01	74F86	U407
318828-01	74HCT244	U106
390089-01	74F245	U903,U904
390310-01	74HCT74	U412,U411,U716
390579-01	74ALS244A	U402
901522-06	7406	U1002
390081-01	74F74	U405,U406,U408
390323-01	4069	U204
901527-03	7905	VR501
390364-01	74LS175	U1203
901882-01	1488	U605
901883-01	1489	U606
CRYSTAL, OSCILLATORS		
390273-01	OSCILLATOR, 48.00 MHZ	OSC401
325566-10	OSCILLATOR 16.00 MHZ	OSC402
325566-01	OSCILLATOR, 16 MHZ	SUB
325566-17	OSCILLATOR, 9.6 MHZ	OSC1001
900560-01	CRYSTAL, 32.768 KHZ	Y201
900556-13	CRYSTAL, 1.8 MHZ	Y601
900558-01	CRYSTAL, 14.318 MHZ	Y801
RESISTOR NETWORKS		
902441-11	150 OHM 6P, 5EL SIP	RP1001
902442-06	68 OHM, 8PIN, 4 ELEMENT	RP701,702
902422-03	33 OHM, 8 PIN, 4 ELEMENT, SIL	RP602,RP703,RP704
902422-02	1K OHM, 8 PIN, 4 ELEMENT, SIL	RP801
902441-31	4.7K 6 PIN, 5 ELEMENT, SIP	RP107,201,304,604
902442-55	4.7K, 8 PIN, 7 ELEMENT, SIP	RP303,603,605
902410-08	4.7K, 10 PIN, 9 ELEMENT, SIP	RP301,302
902410-07	10K, 10 PIN, 9 ELEMENT, SIP	RP502,507
902441-15	330 OHM, 6 PIN, 5 ELEMENT, SIP	RP508

RESISTORS 5% @ 1/4 WATT		
901550-39	CARBON FILM, 3.9K OHM	R1203
901550-64	CARBON FILM, 10 OHM	R503-R506,R210-R212
901550-105	CARBON FILM, 33 OHM	R603,609,701
901550-94	CARBON FILM, 68 OHM	R1001,R209
901550-45	CARBON FILM, 75 OHM	R801,R411
901550-124	CARBON FILM, 160 OHM	R1201
901550-52	CARBON FILM, 220 OHM	R804,R902,R507,R207, R214
901550-12	CARBON FILM, 22K OHM	R1202
901550-01	CARBON FILM, 1K OHM	R121,510,R204,407,702, 1204,412,502,508,1003, 1004
901550-18	CARBON FILM, 2.2K OHM	R604,R608
901550-19	CARBON FILM, 4.7K OHM	R105,R404,R413,414, R606,901,R803,R1002, R904,806,R406,R509, R903,811
901550-03	CARBON FILM, 5.1K OHM	R805
901550-20	CARBON FILM, 10K OHM	R202,R501,R605,905, 302,R703,R704
901550-84	CARBON FILM, 1M OHM	R203,R601,R602,R807, 205
901600-28	CARBON FILM, 2.2 OHM, 1/2W 5%	R208,R610
901550-17	CARBON FILM, 1.2 OHM	R1205
901550-110	CARBON FILM, 51 OHM	R907
901550-92	CARBON FILM, 20K OHM	R301
901550-70	CARBON FILM, 300 OHM	R809
901600-28	CARBON FILM, 2.2 OHM	R208,R610
RESISTORS 1% @ 1/4 WATT		
901751-44	CARBON FILM, 150 OHM	R206,R1005,1006
901751-70	CARBON FILM, 210K OHM	R201
RADIAL CERAMIC CAPACITORS 5% @ 50 VOLT		
900019-13	RADIAL LEAD, 22pF	C601,C402
900019-25	RADIAL LEAD, 27pF	C202
900019-17	RADIAL LEAD, 47pF	C204,C205,C602,C802-C804
900020-04	RADIAL CERAMIC .0047uF	C201
900019-15	RADIAL LEAD, 100pF	C603,C621-626,C514-C532
900019-21	RADIAL LEAD, 1000pF	C206,C627,C207
900022-03	MONO., RADIAL LEAD, .1uF	C203,CB2031-2034, CB205,CB206,CB3011, CB3012,CB302,CB3031-3039,CB3041-3048, CB401,402,408,412,414, CB501,CB502,CB6011, CB6012,CB602-605, CB6051,CB6052,CB706, CB716,CB722,CB8011, CB8012,CB8021, CB8022,CB902,1001, CB901,CB905,116, CB1002,1121,CB1101, CB1102
900022-05	MONO., RADIAL LEAD, .33uF	CB723-726,707-714,403-407,409-411,CB415, CB416,CB701-705,715, 717-721,803,CB903, 904,1201-1205,413, CB305
900022-01	MONO., RADIAL LEAD, .22uF	C511,CB126
ELECTROLYTIC CAPACITORS		
390101-08	ELECT., ALUM., RADIAL, 1uF	C507,C513
390101-05	CAP ELECT., TAN, 10uF	C208
390101-01	ELECT., ALUM., RADIAL, 47uF	C501-C506,C508-C510, C512
390101-06	ELECT., ALUM., RADIAL 10uF	C1202

COMPONENT PARTS LIST
PCB ASSEMBLY #313235-01 *(Continued)*

MISCELLANEOUS		
251842-02	EMI FILTER 100PF	EMI624-1631,1201
390257-01	EMI FILTER 22000PF	EMI1203
390297-03	EMI FILTER 2200PF	EMI201,202
390275-04	EMI FILTER 150 PF	EMI607-623
903025-08	FERRITE BEADS (AXIAL)	FB403,404,1001
903025-01	FERRITE BEADS (AXIAL)	FB405-409,FB205,207, FB902,FB1201,FB501, FB502,FB801,FB802, FB901,601-608
390253-02	FERRITE BEADS THREE TURN	FB201-204
900850-01	DIODE 1N4148	CR201,CR202,CR501, CR502,CR601-CR603
380393-01	BATTERY, NICAD 3.6V	BT201,BT202
390280-01	FUSE, PICO, 4A	FU601
390321-01	DELAY LINE 10 TAP @ 20 NS	DL701
902658-01	TRANSISTOR 2N3904	Q601,Q801,Q1201
312680-01	PIEZO BEEPER QMB12	PZ801
251260-01	PUSH BUTTON N.O. SWITCH	PB501
904775-01	PIANO DIP SWITCH, 1 PIN, 4 POS.	SW101
904150-05	SOCKET, 28 PIN, DIP	U108,109,U1101,U1102
904150-06	SOCKET, 40 PIN, DIP	U302
390185-02	SOCKET, 68 PIN, PLCC	U301,U601
390185-01	SOCKET, 84 PIN, PLCC	U303,304,801,802

MISCELLANEOUS *(Continued)*		
390242-01	D-SUB, 9 PIN, RT. ANGLE MALE	CN601
390242-05	D-SUB, 25 PIN, RT. ANGLE MALE	CN603
390241-05	D-SUB, 25 PIN, TR. ANGLE FEMALE	CN602
903446-25	EXPANSION CONNECTOR, 62 PIN	CN501,CN503,CN505, CN507
903446-04	EXPANSION CONNECTOR, 36 PIN	CN502,CN504,CN506
252166-03	DIN, TK PIN, ROUND, FEMALE	CN201
252122-01	JACK, RCA RT. ANGLE, FEMALE	CN1201
903326-03	HEADER, 3 PIN, SIL	CB902,JMP904,CN512, CN202
903326-02	HEADER, 2 PIN, SIL	JMP903 (REMOVE P13 FOR KEY) 701,702
903345-17	HEADER, 34 PIN, DIL	CN1001
903345-20	HEADER, 40 PIN, DIL	CN901
903349-01	POWER CONNECTOR, 6 PIN.	CN509
390043-01	SHORTING BLOCKS, 2 POS.	JM904
390186-01	JUMPER	R810

SUBSTITUTE PARTS		
390341-01	IC, 8742 MICROCNTRL EPROM	U203 SUB:
390317-01	IC, FE3010A	U802 SUB:
390304-01	IC, WD37C65	U1001 SUB:
390304-02	IC, WD37C65A	U1001 SUB:
380259-01	IC, M146818A RTC/CMOS RAM	U201 SUB:

PCB ASSEMBLY #313235-02

PCB ASSEMBLY 313235-02 has the same components as -01 with the following additions or omissions.

ADDITIONS AND OMISSIONS		
390083-04	IC, DRAM 64 x 4 100 NS	U709,710,713,714
390083-05	IC, DRAM 64 x 4 80NS	SUB: -04
901550-19	RESISTOR, CARBON FILM 4.7K OHM	R109,110
901550-01	RESISTOR, CARBON FILM 1K OHM	
	FOR -01 LIST OMIT	R1204,R120
	ADD FOR -01	R720,R106
	OMIT FROM -01	R1205,EMI1201, Q1201,CN1201

SOFTWARE SUB-ASSEMBLY (US)

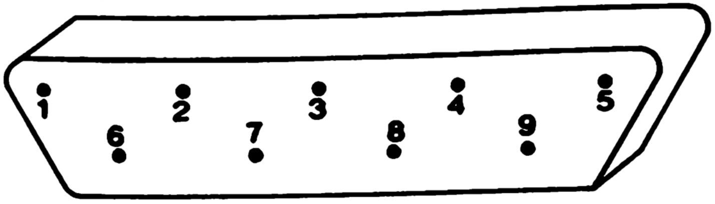
315900-01	**COLT 286 SOFTWARE SUB-ASSY (US)**
319293-01	DOS 3.30A MANUAL (ENGLISH)
319292-01	BASIC 3.22 MANUAL (ENGLISH)
363204-01	OPERATIONS GUIDE (ENGLISH)
318896-01	PROGRAM LICENSE AGREEMENT
314877-02	SERVICE CENTER LIST (US)
318980-01	MANUAL COLT 286
317812-01	DISK ASSY (DOS3.30/BASIC3.22/EGA800OUTIL)

SECTION 5

- **CONNECTOR PINOUTS**
- **SCHEMATICS**
  - **PCB ASSEMBLY 313235-01
SCHEMATIC 313056-01, REV. 8.1**
  - **PCB ASSEMBLY 313235-02
SCHEMATIC 313236-01, REV. 1.4**

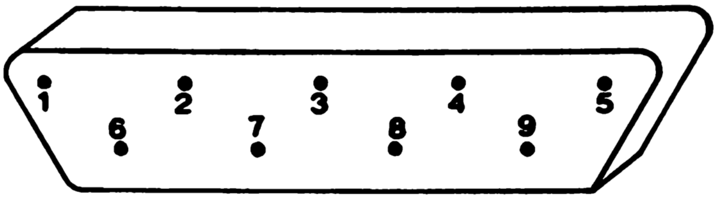
MOUSE PORT

CN601 (5mm)



Pin No.	Signal
1.	Vertical
2.	Horizontal
3.	Vertical Q
4.	Horizontal Q
5.	Button (3)
6.	Button (1)
7.	+ 5V
8.	Ground
9.	Button (2)

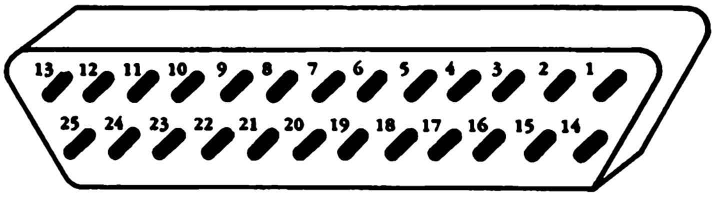
VIDEO PORT



Pin No.	Signal
1.	Ground
2.	Secondary Red/Ground
3.	Primary Red
4.	Primary Green
5.	Primary Blue
6.	Secondary Green/Intensity
7.	Secondary Blue/Mono Video
8.	Horizontal Retrace
9.	Vertical Retrace

SERIAL PORT

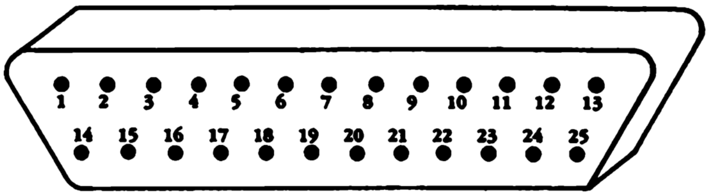
CN603 (5mm)



Computer Side			Peripheral Side
	1	CHASSIS GROUND	
	2	T x D	→
←	3	R x D	
	4	RTS	→
←	5	CTS	
←	6	DSR	
	7	SIG GND	
←	8	DCD	
	9	+ 12V	
	10	− 12V	
	20	DTR	→
←	22	RI	

PARALLEL PORT

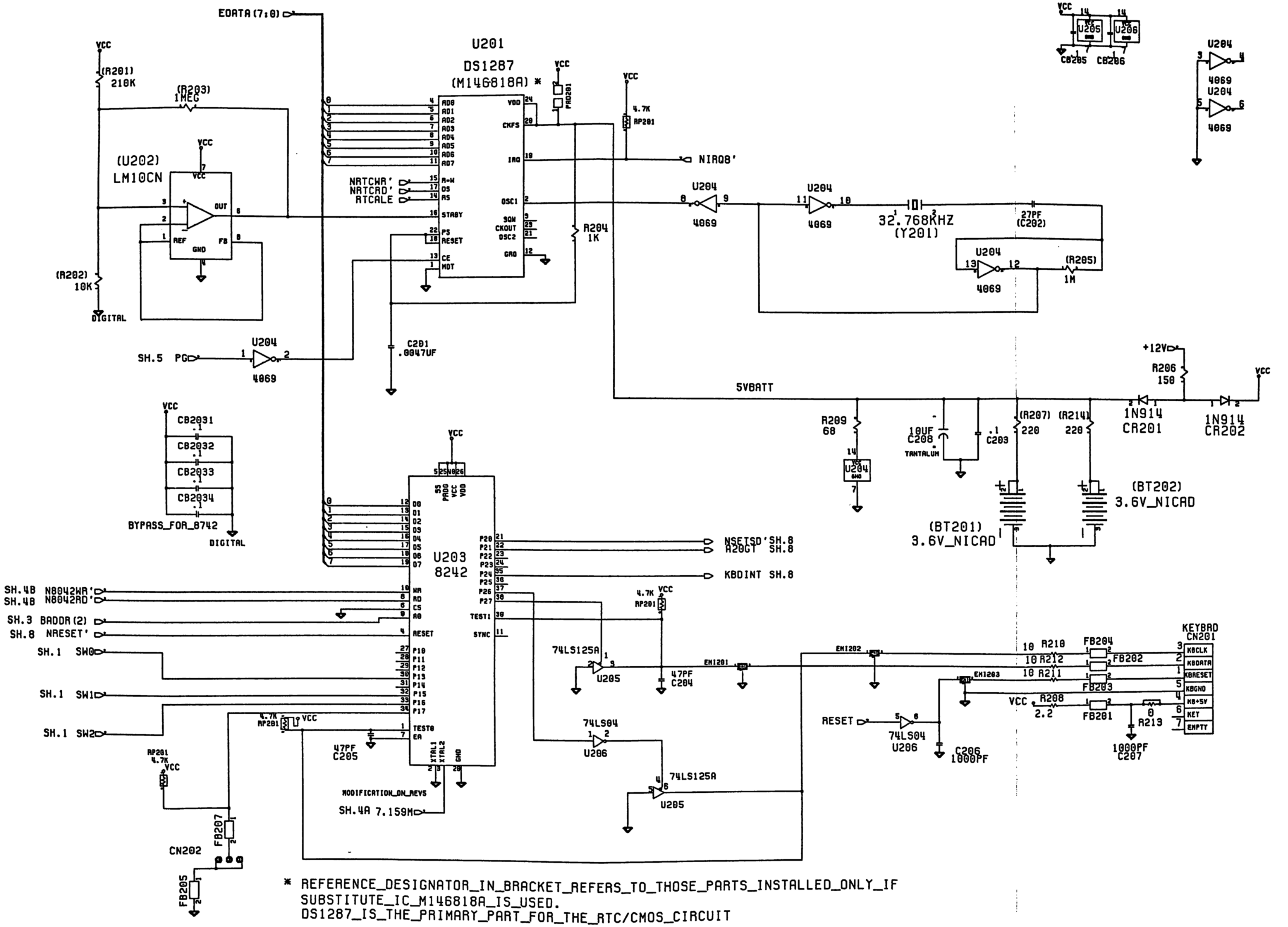
CN602 (5mm)



Computer Side			Printer Side
	1	STROBE	→
	2	D0	→
	3	D1	→
	4	D2	→
	5	D3	→
	6	D4	→
	7	D5	→
	8	D6	→
	9	D7	→
←	10	ACK	
←	11	BUSY	
←	12	PE	
←	13	SLCT	
	14	AUTO FDXT	→
←	15	ERROR	
	16	INIT	→
	17	SLCT IN	→
	18-25	GND	

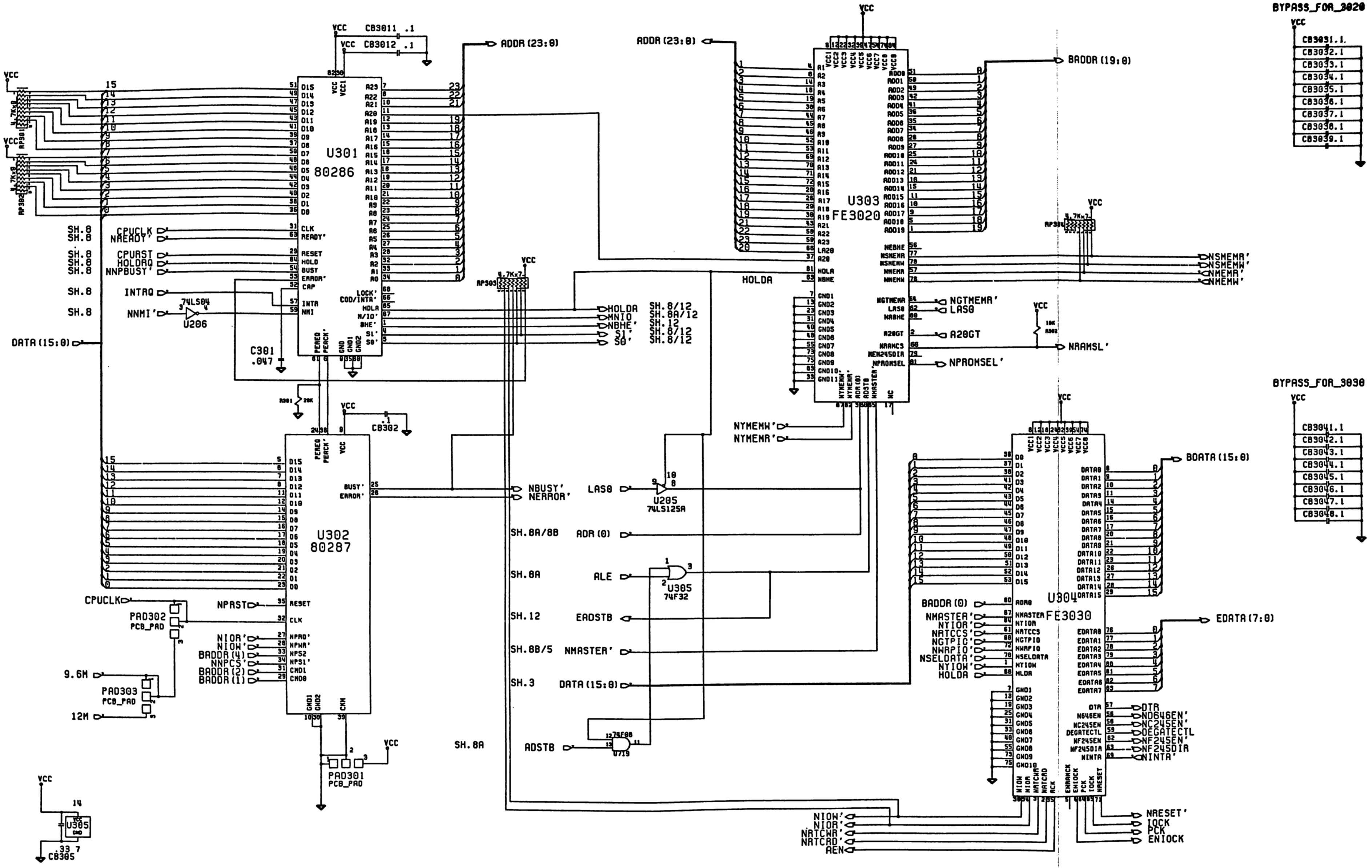
Schematic #313056, Rev. 8.1

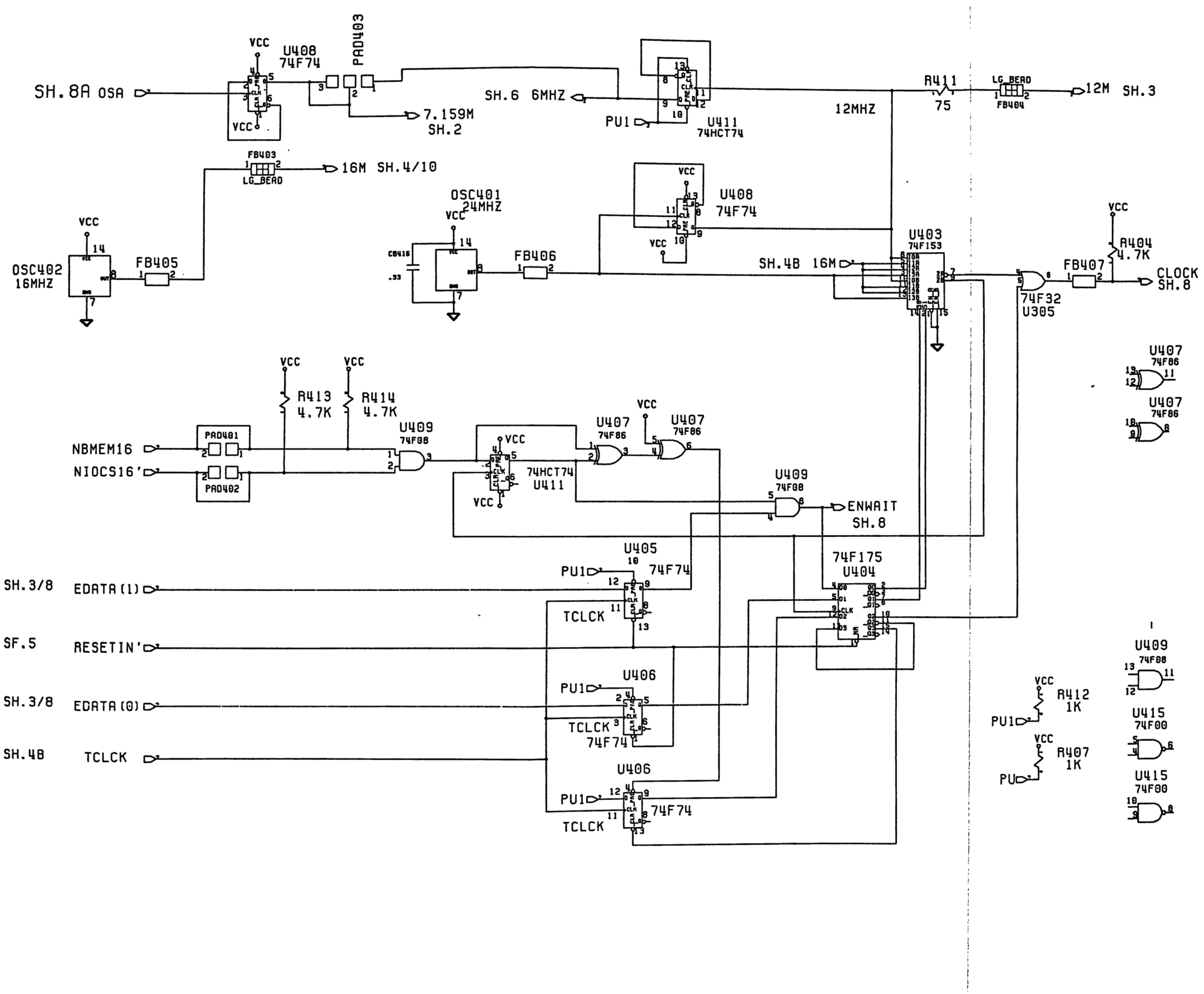
Sheet 1 of 13

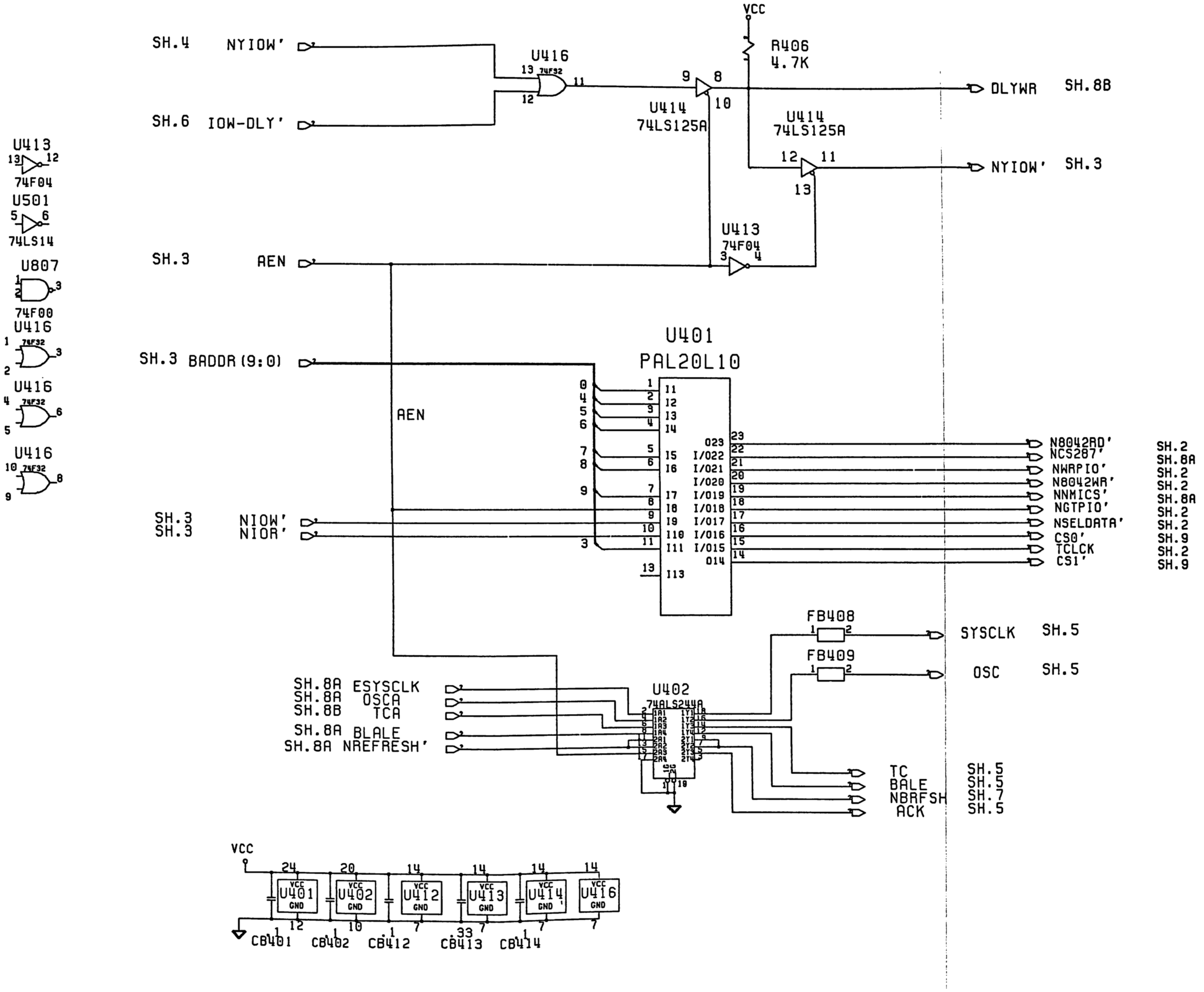


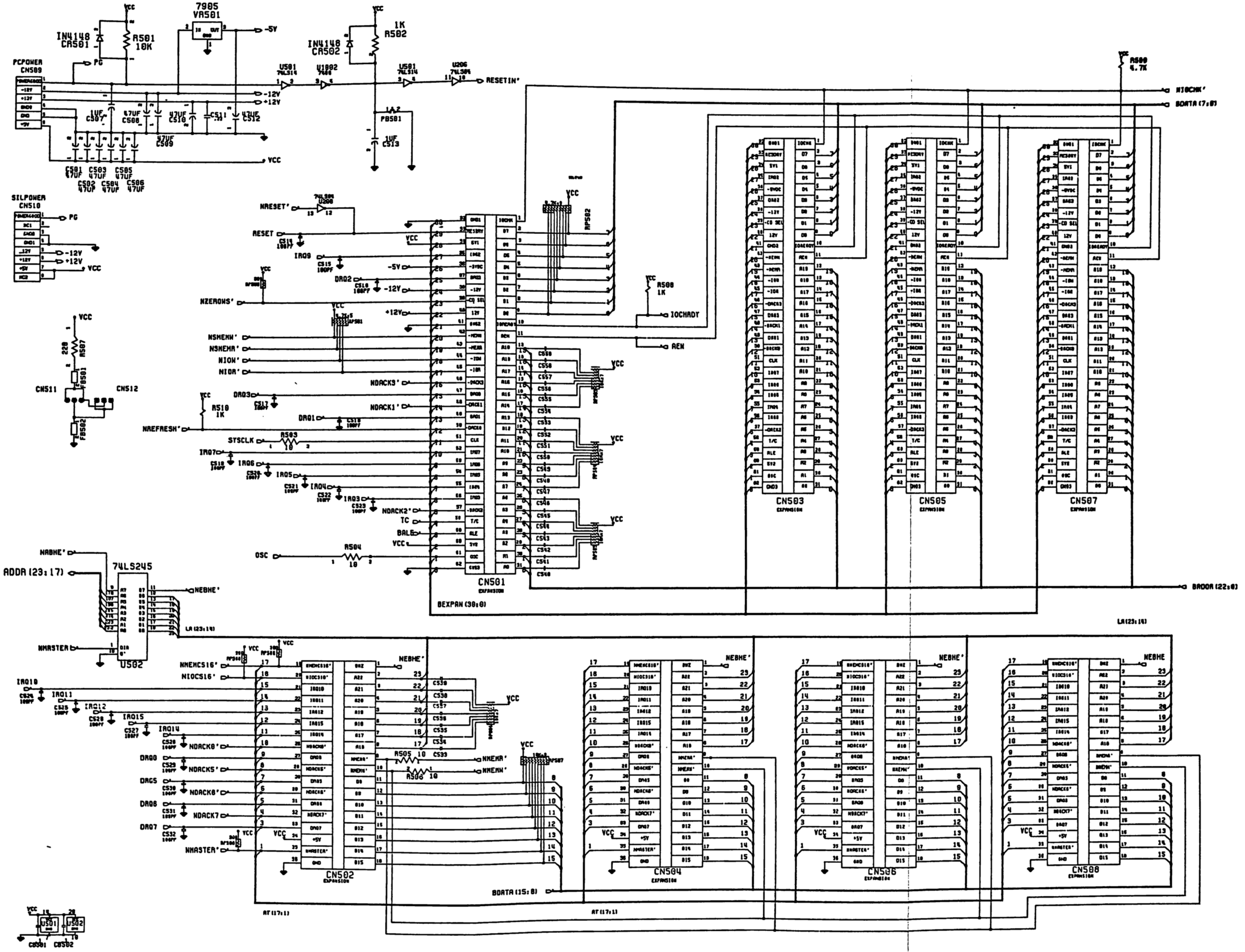
* REFERENCE_DESIGNATOR_IN_BRACKET_REFERS_TO_THOSE_PARTS_INSTALLED_ONLY_IF SUBSTITUTE_IC_M146818A_IS_USED.
DS1287_IS_THE_PRIMARY_PART_FOR_THE_RTC/CMOS_CIRCUIT

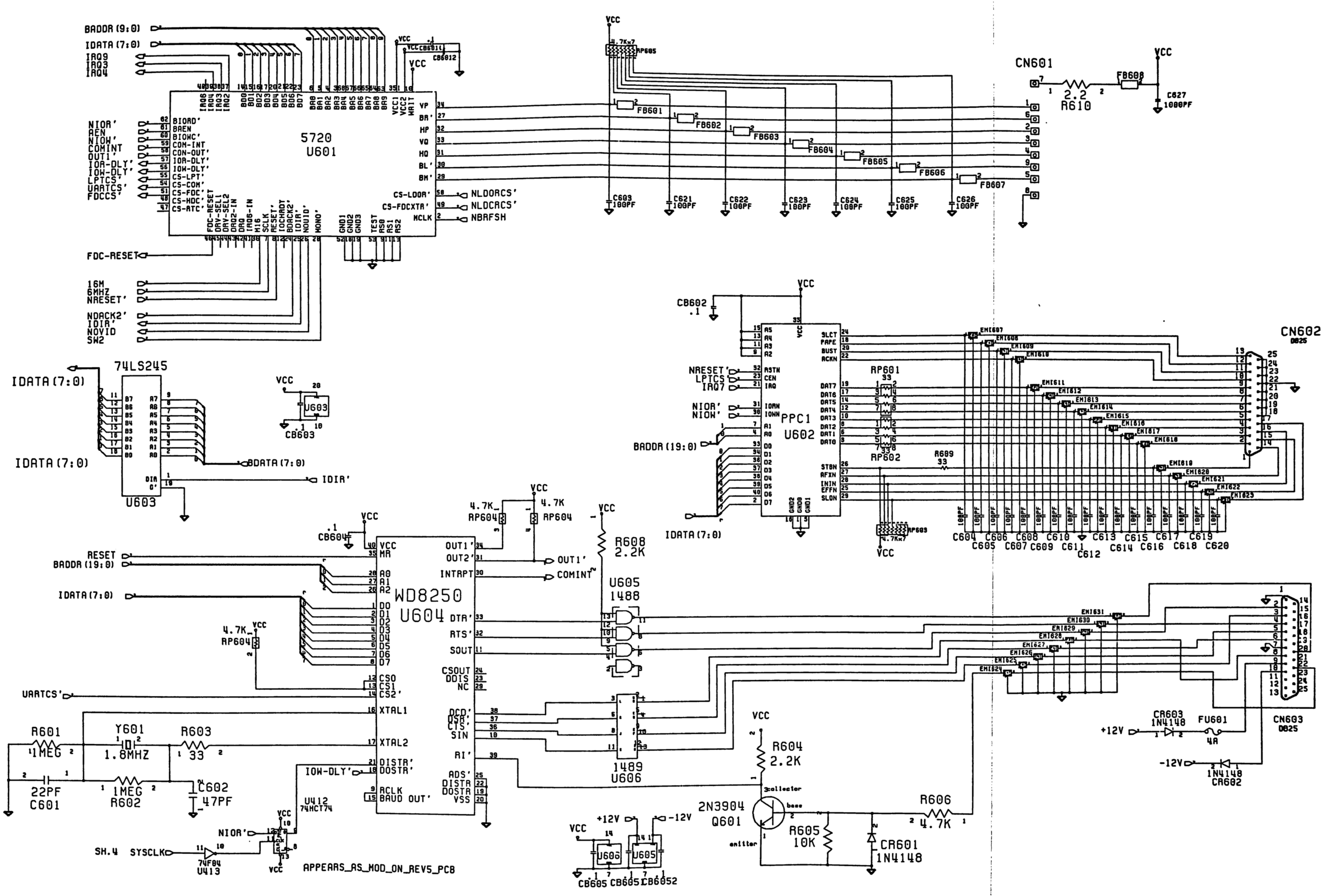
]


VCC
CB3011 .1
CB3012 .1
ADDR(23:0)
U301
80286
RP301 4.7Kx8
RP302 4.7Kx8
SH.8 CPUCLK
SH.8 NREADY'
SH.8 CPURST
SH.8 HOLDRQ
SH.8 NNPBUSY'
SH.8 INTRQ
SH.8 NNMI'
74LS04
U206
DATA(15:0)
C301 .047
R301 20K
CB302 .1
HOLDA
NMIO
NBHE'
S1'
S0'
SH.8/12
SH.8A/12
SH.12
SH.8/12
SH.8/12
RP303 4.7Kx7
U302
80287
NBUSY'
NERROR'
CPUCLK
PAD302 PCB_PAD
NPRST
NIOR'
NIOW'
BADDR(4)
NNPCS'
BADDR(2)
BADDR(1)
9.6M
PAD303 PCB_PAD
12M
PAD301 PCB_PAD
VCC
U305
.33 7
CB305
14
SH.8A
LAS0
U205
74LS125A
SH.8A/8B ADR(0)
SH.8A ALE
U305
74F32
SH.12 EADSTB
SH.8B/5 NMASTER'
SH.3 DATA(15:0)
SH.8A ADSTB
74F08
U719
ADDR(23:0)
U303
FE3020
BADDR(19:0)
HOLDA
NYMEMW'
NYMEMR'
NGTMEMR'
LAS0
A20GT
10K
R302
NRAMSL'
NPROMSEL'
RP304 4.7Kx7
NSMEMR'
NSMEMW'
NMEMR'
NMEMW'
BYPASS_FOR_3020
CB3031.1
CB3032.1
CB3033.1
CB3034.1
CB3035.1
CB3036.1
CB3037.1
CB3038.1
CB3039.1
BYPASS_FOR_3030
CB3041.1
CB3042.1
CB3043.1
CB3044.1
CB3045.1
CB3046.1
CB3047.1
CB3048.1
U304
FE3030
BDATA(15:0)
EDATA(7:0)
BADDR(0)
NMASTER'
NYIOR'
NATCCS'
NGTPIO'
NWAPIO'
NSELDATA'
NYIOW'
HOLDA
DTR
N646EN'
NC245EN'
DEGATECTL
NF245EN'
NF245DIR
NINTA'
NIOW'
NIOR'
NATCWR'
NATCRD'
AEN
NRESET'
IOCK
PCK
ENIOCK


SH.8A OSA
VCC
U408
74F74
PAD403
7.159M
SH.2
SH.6 6MHZ
PU1
U411
74HCT74
12MHZ
R411
75
LG_BEAD
FB404
12M SH.3
FB403
LG_BEAD
16M SH.4/10
OSC401
24MHZ
C8416
.33
FB406
U408
74F74
VCC
OSC402
16MHZ
FB405
U403
74F153
SH.4B 16M
R404
4.7K
FB407
CLOCK
SH.8
74F32
U305
U407
74F86
U407
74F86
R413
4.7K
R414
4.7K
U409
74F08
PAD401
NBMEM16
NIOCS16'
PAD402
74HCT74
U411
U407
74F86
U407
74F86
U409
74F08
ENWAIT
SH.8
U405
74F74
74F175
U404
SH.3/8
EDATA(1)
TCLCK
SF.5
RESETIN'
U406
SH.3/8
EDATA(0)
TCLCK
74F74
SH.4B
TCLCK
U406
74F74
TCLCK
U409
74F08
VCC
R412
1K
PU1
VCC
R407
1K
PU
U415
74F00
U415
74F00

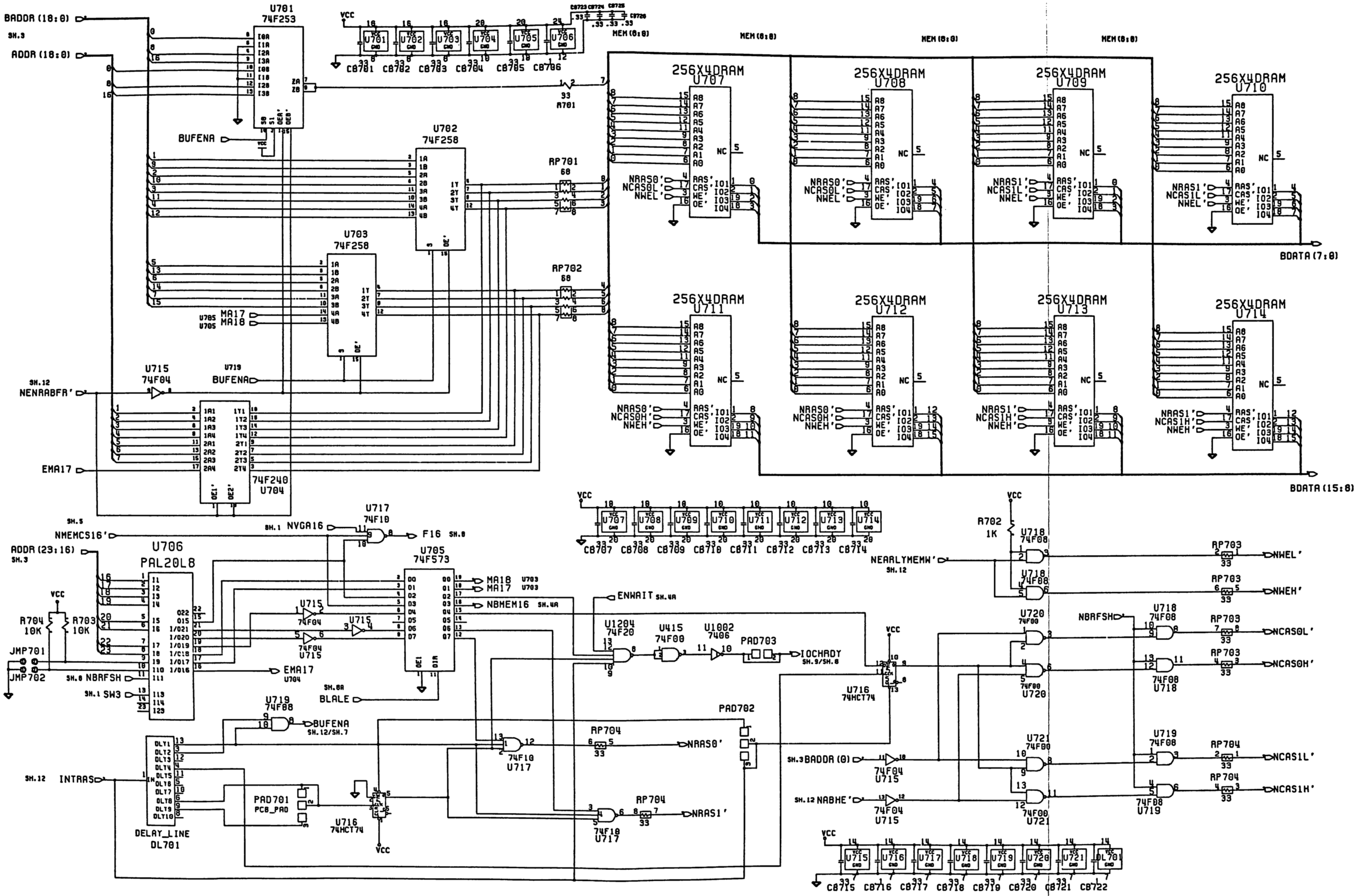

VCC
R406
4.7K
SH.4 NYIOW'
SH.6 IOW-DLY'
U416
74F32
U414
74LS125A
DLYWR SH.8B
NYIOW' SH.3
U413
74F04
SH.3 AEN
SH.3 BADDR(9:0)
AEN
U401
PAL20L10
N8042RD' SH.2
NCS287' SH.8A
NWRPIO' SH.2
N8042WR' SH.2
NNMICS' SH.8A
NGTPIO' SH.2
NSELDATA' SH.2
CS0' SH.9
TCLCK SH.2
CS1' SH.9
SH.3 NIOW'
SH.3 NIOR'
U413
74F04
U501
74LS14
U807
74F00
U416
74F32
FB408
SYSCLK SH.5
FB409
OSC SH.5
SH.8A ESYSCLK
SH.8A OSCA
SH.8B TCA
SH.8A BLALE
SH.8A NREFRESH'
U402
74ALS244A
TC SH.5
BALE SH.5
NBRFSH SH.7
ACK SH.5
VCC
U401
U402
U412
U413
U414
U416
CB401
CB402
CB412
CB413
CB414

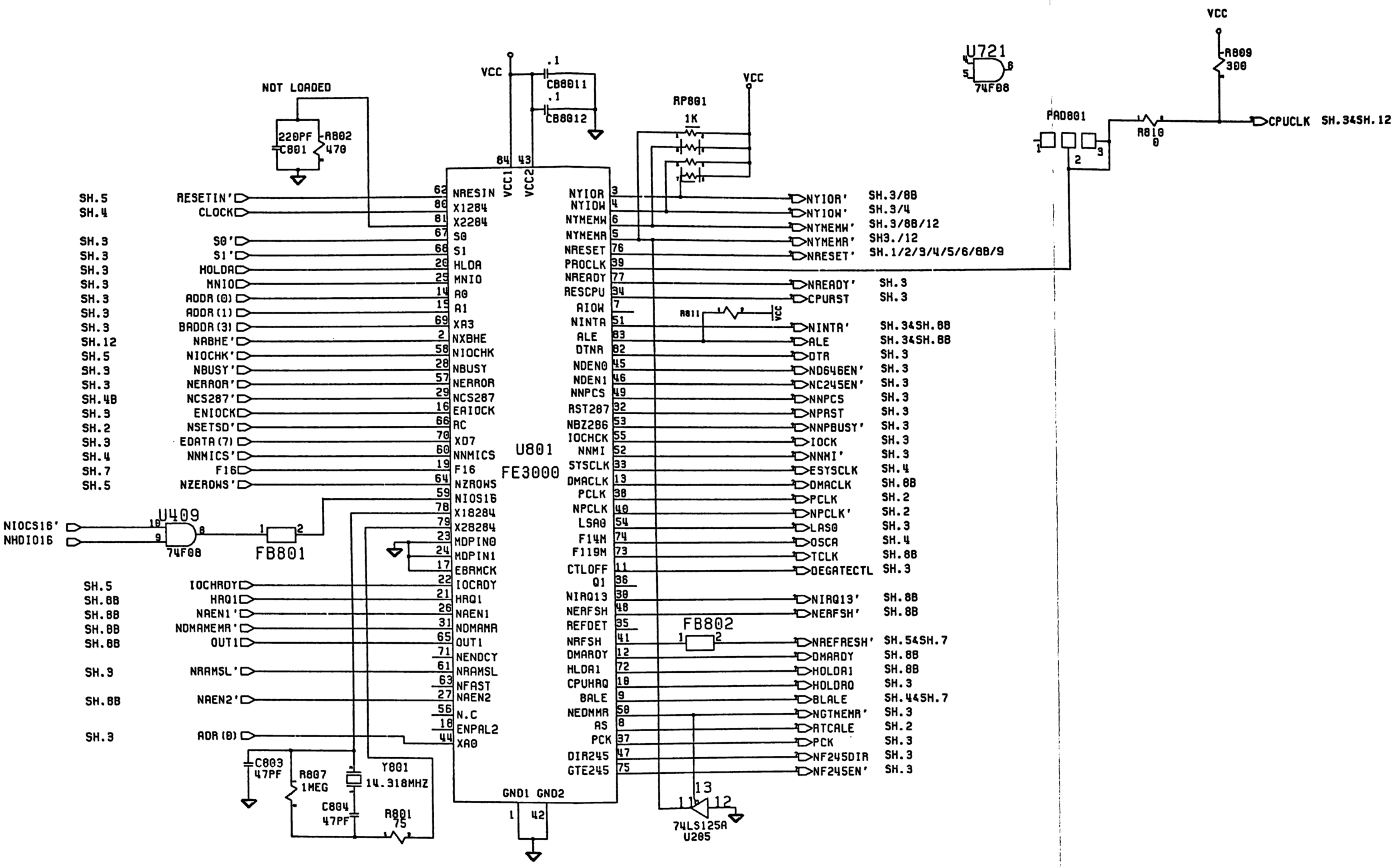

7905
VR501
IN4148
CR501
R501
10K
IN4148
CR502
1K
R502
U501
74LS14
U1002
U206
RESETIN'
-5V
-12V
+12V
PCPOWER
CN509
1UF
C507
47UF
C508
C510
C511
C512
C509
C501
C502
C503
C504
C505
C506
47UF
PG
VCC
FB501
C513
SILPOWER
CN510
R507
220
FB502
CN511
CN512
NRESET'
RESET
IRQ9
DRQ2
NZEROWS'
NSMEMW'
NSMEMR'
NIOW'
NIOR'
NDACK3'
NDACK1'
DRQ3
DRQ1
R510
1K
NREFRESH'
SYSCLK
R503
10
IRQ7
IRQ6
IRQ5
IRQ4
IRQ3
NDACK2'
TC
BALE
OSC
R504
10
RP502
R508
1K
IOCHRDY
AEN
NIOCHK'
BDATA(7:0)
R509
4.7K
CN501
EXPANSION
BEXPAN(30:0)
CN503
CN505
CN507
EXPANSION
BADDR(22:0)
NSBHE'
ADDR(23:17)
74LS245
U502
NEBHE'
LA(23:14)
NMASTER
NMEMCS16'
NIOCS16'
IRQ10
IRQ11
IRQ12
IRQ15
IRQ14
NDACK0'
DRQ0
NDACK5'
DRQ5
NDACK6'
DRQ6
NDACK7'
DRQ7
NMASTER'
R505 10
R506 10
NMEMR'
NMEMW'
RP507
CN502
CN504
CN506
CN508
BDATA(15:8)
AT(17:1)


BADDR(9:0)
IDATA(7:0)
IRQ9
IRQ3
IRQ4
5720
U601
NIOR'
AEN
NIOW'
COMINT
OUT1'
IOR-DLY'
IOW-DLY'
LPTCS'
UARTCS'
FDCCS'
BIORD'
BAEN
BIOWC'
COM-INT
COM-OUT'
IOR-DLY'
IOW-DLY'
CS-LPT'
CS-COM'
CS-FDC'
CS-HDC'
CS-RTC'
FDC-RESET
DRV-SEL1
DRV-SEL2
DRQ2-IN
DRQ
IRQ6-IN
M16
SCLK
RESET
IOCHRDY
BDACK2'
IDIR'
NOVID'
MONO'
GND1
GND2
GND3
TEST
AS0
AS1
AS2
VP
BR'
HP
VO
HO
BL'
BM'
CS-LDOR'
CS-FDCXTR'
NCLK
NLDORCS'
NLDCRCS'
NBRFSH
FDC-RESET
16M
6MHZ
NRESET'
NDACK2'
IDIR'
NOVID
SW2
VCC
CB6011
CB6012
VCC
4.7Kx7
RP605
FB601
FB602
FB603
FB604
FB605
FB606
FB607
C603 100PF
C621 100PF
C622 100PF
C623 100PF
C624 100PF
C625 100PF
C626 100PF
CN601
R610
2.2
FB608
VCC
C627 1000PF
74LS245
U603
IDATA(7:0)
IDATA(7:0)
BDATA(7:0)
IDIR'
DIR
G'
VCC
U603
CB603 .1
VCC
CB602 .1
NRESET'
LPTCS'
IRQ7
NIOR'
NIOW'
BADDR(19:0)
IDATA(7:0)
A5
A4
A3
A2
RSTN
CEN
IRQ
IORN
IOWN
A1
A0
D0
D1
D2
D3
D4
D5
D6
D7
PPC1
U602
SLCT
PAPE
BUSY
ACKN
DAT7
DAT6
DAT5
DAT4
DAT3
DAT2
DAT1
DAT0
STBN
AFXN
ININ
EFFN
SLON
GND2
GND0
GND1
RP601 33
RP602
R609 33
RP603 4.7Kx7
VCC
EMI607
EMI608
EMI609
EMI610
EMI611
EMI612
EMI613
EMI614
EMI615
EMI616
EMI617
EMI618
EMI619
EMI620
EMI621
EMI622
EMI623
C604
C605
C606
C607
C608
C609
C610
C611
C612
C613
C614
C615
C616
C617
C618
C619
C620
CN602
DB25
VCC
.1
CB604
RESET
BADDR(19:0)
IDATA(7:0)
4.7K
VCC
RP604
WD8250
U604
VCC
MR
A0
A1
A2
D0
D1
D2
D3
D4
D5
D6
D7
CS0
CS1
CS2'
XTAL1
XTAL2
DISTR'
DOSTR'
RCLK
BAUD OUT'
OUT1'
OUT2'
INTRPT
DTR'
RTS'
SOUT
CSOUT
DDIS
NC
DCD'
DSR'
CTS'
SIN
RI'
ADS'
DISTR
DOSTR
VSS
4.7K
RP604
4.7K
RP604
OUT1'
COMINT
VCC
R608 2.2K
U605 1488
1489 U606
UARTCS'
R601 1MEG
Y601 1.8MHZ
R603 33
22PF C601
1MEG R602
C602 47PF
IOW-DLY'
U412 74HCT74
NIOR'
VCC
SH.4 SYSCLK
74F04 U413
VCC
APPEARS_AS_MOD_ON_REV5_PCB
VCC
+12V
-12V
U606
U605
CB605
CB6051
CB6052
EMI624
EMI625
EMI626
EMI627
EMI628
EMI629
EMI630
EMI631
VCC
R604 2.2K
2N3904 Q601
collector
base
emitter
R605 10K
CR601 1N4148
R606 4.7K
+12V
CR603 1N4148
FU601 4A
-12V
1N4148 CR602
CN603 DB25

Schematic #313056, Rev. 8.1

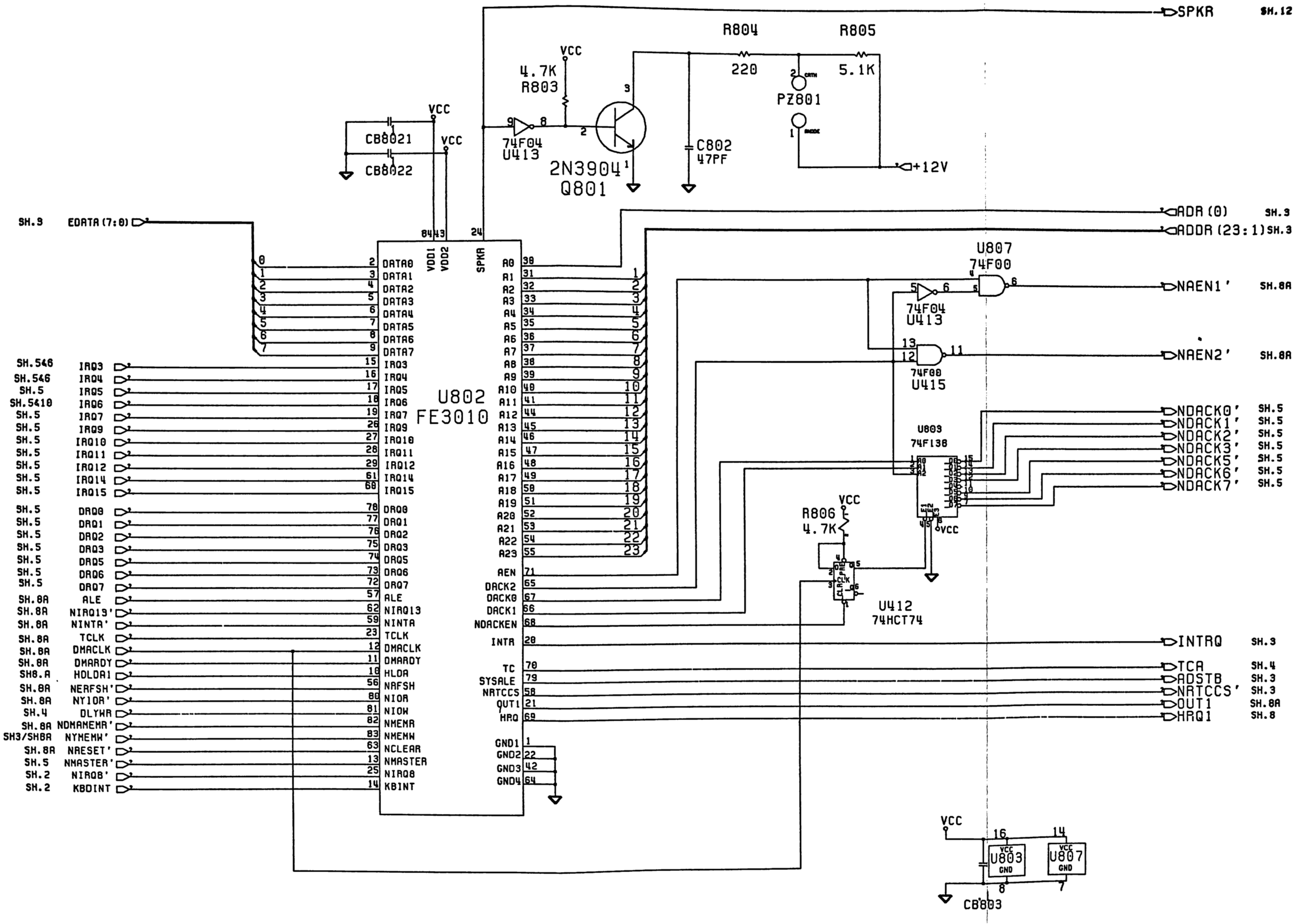
Sheet 7 of 13

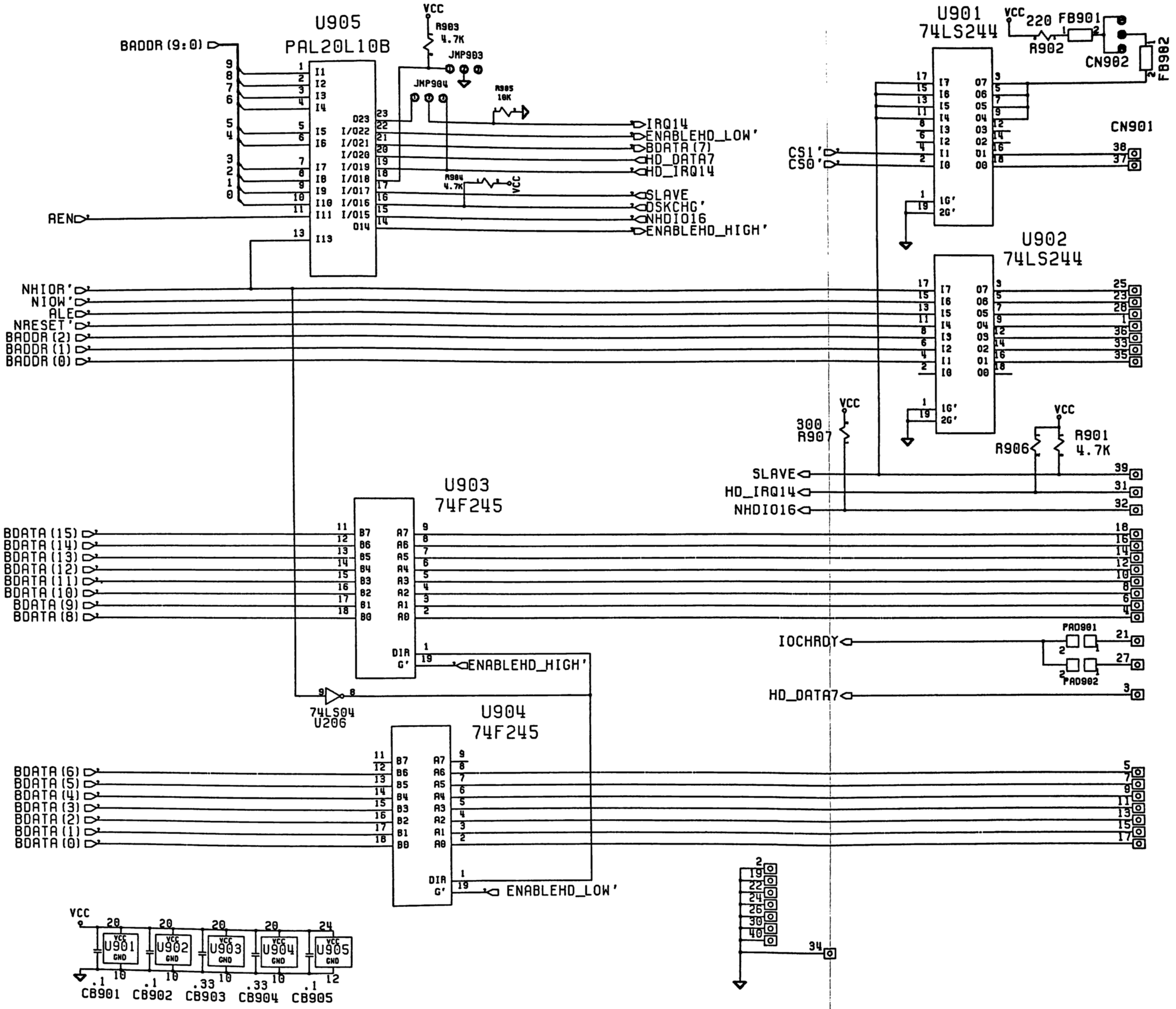


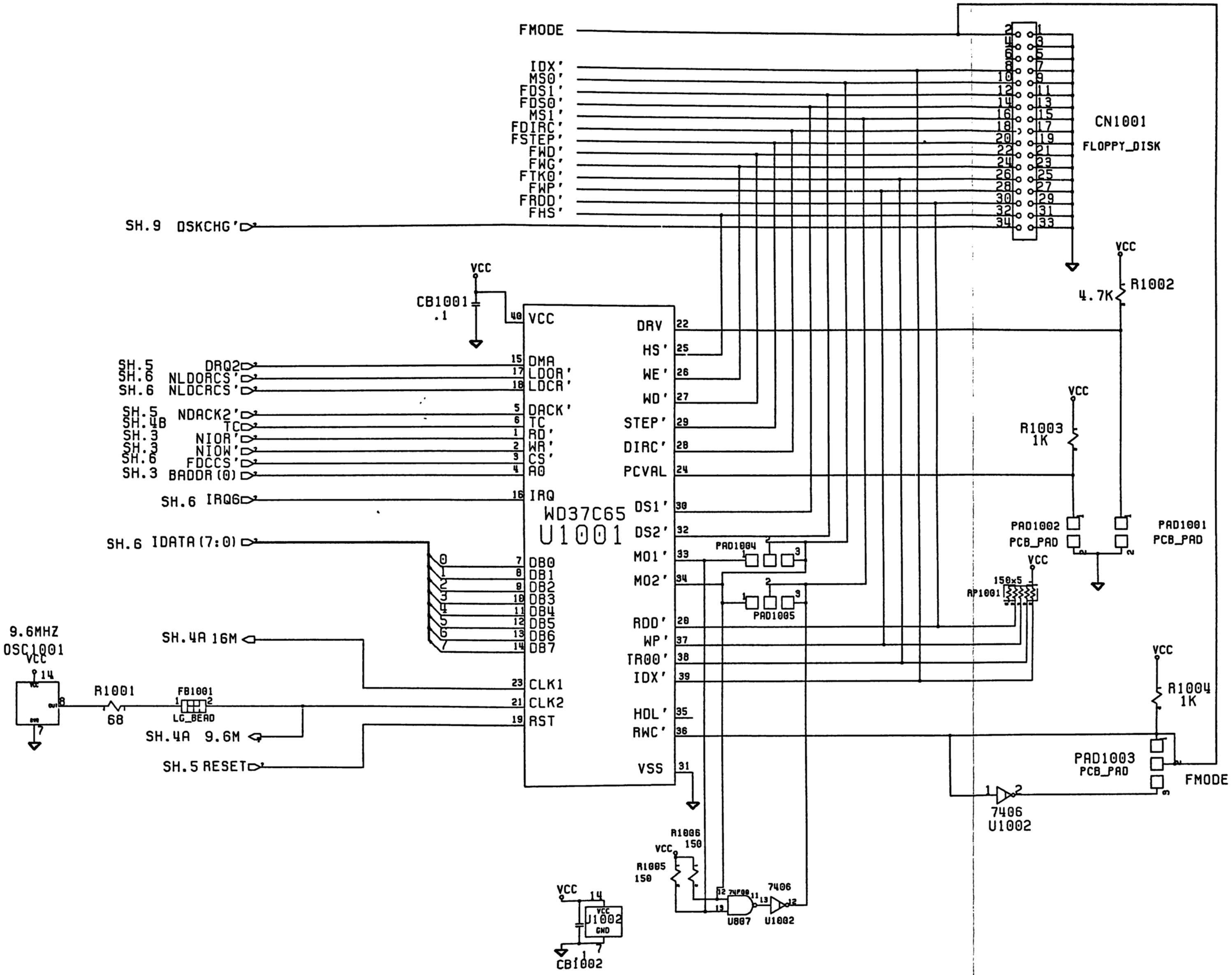

U801
FE3000
NOT LOADED
220PF
C801
R802
470
VCC
.1
C8011
.1
C8812
VCC1
VCC2
84
43
RP801
1K
VCC
U721
74F08
PAD801
R810
0
VCC
R809
300
CPUCLK SH.3&SH.12
SH.5 RESETIN' 62 NRESIN
SH.4 CLOCK 86 X1284
81 X2284
SH.3 S0' 67 S0
SH.3 S1' 66 S1
SH.3 HOLDA 20 HLDA
SH.3 MNIO 25 MNIO
SH.3 ADDR(0) 14 A0
SH.3 ADDR(1) 15 A1
SH.3 BADDR(3) 69 XA3
SH.12 NABHE' 2 NXBHE
SH.5 NIOCHK' 58 NIOCHK
SH.3 NBUSY' 28 NBUSY
SH.3 NERROR' 57 NERROR
SH.4B NCS287' 29 NCS287
SH.3 ENIOCK 16 EAIOCK
SH.2 NSETSD' 66 RC
SH.3 EDATA(7) 70 XD7
SH.4 NNMICS' 60 NNMICS
SH.7 F16 19 F16
SH.5 NZEROWS' 64 NZROWS
59 NIOS16
78 X18284
79 X28284
23 MDPIN0
24 MDPIN1
17 EBRMCK
NIOCS16'
NHDIO16
U409
74F08
FB801
SH.5 IOCHRDY 22 IOCRDY
SH.8B HRQ1 21 HRQ1
SH.8B NAEN1' 26 NAEN1
SH.8B NDMAMEMR' 31 NDMAMR
SH.8B OUT1 65 OUT1
71 NENDCY
SH.3 NRAMSL' 61 NRAMSL
63 NFAST
SH.8B NAEN2' 27 NAEN2
56 N.C
18 ENPAL2
SH.3 ADR(0) 44 XA0
C803
47PF
R807
1MEG
Y801
14.318MHZ
C804
47PF
R801
75
GND1 GND2
1 42
NYIOR 3 NYIOR' SH.3/8B
NYIOW 4 NYIOW' SH.3/4
NYMEMW 6 NYMEMW' SH.3/8B/12
NYMEMR 5 NYMEMR' SH3./12
NRESET 76 NRESET' SH.1/2/3/4/5/6/8B/9
PROCLK 39
NREADY 77 NREADY' SH.3
RESCPU 34 CPURST SH.3
AIOW 7
R811
NINTA 51 NINTA' SH.3&SH.8B
ALE 83 ALE SH.3&SH.8B
DTNR 82 DTR SH.3
NDEN0 45 ND646EN' SH.3
NDEN1 46 NC245EN' SH.3
NNPCS 49 NNPCS SH.3
RST287 32 NPRST SH.3
NBZ286 53 NNPBUSY' SH.3
IOCHCK 55 IOCK SH.3
NNMI 52 NNMI' SH.3
SYSCLK 33 ESYSCLK SH.4
DMACLK 13 DMACLK SH.8B
PCLK 38 PCLK SH.2
NPCLK 40 NPCLK' SH.2
LSA0 54 LAS0 SH.3
F14M 74 OSCA SH.4
F119M 73 TCLK SH.8B
CTLOFF 11 DEGATECTL SH.3
Q1 36
NIRQ13 30 NIRQ13' SH.8B
NERFSH 48 NERFSH' SH.8B
REFDET 35
FB802
NRFSH 41 NREFRESH' SH.5&SH.7
DMARDY 12 DMARDY SH.8B
HLDA1 72 HOLDA1 SH.8B
CPUHRQ 10 HOLDRQ SH.3
BALE 9 BLALE SH.4&SH.7
NEDMMR 50 NGTMEMR' SH.3
AS 8 ATCALE SH.2
PCK 37 PCK SH.3
DIR245 47 NF245DIR SH.3
GTE245 75 NF245EN' SH.3
13
11 12
74LS125A
U205

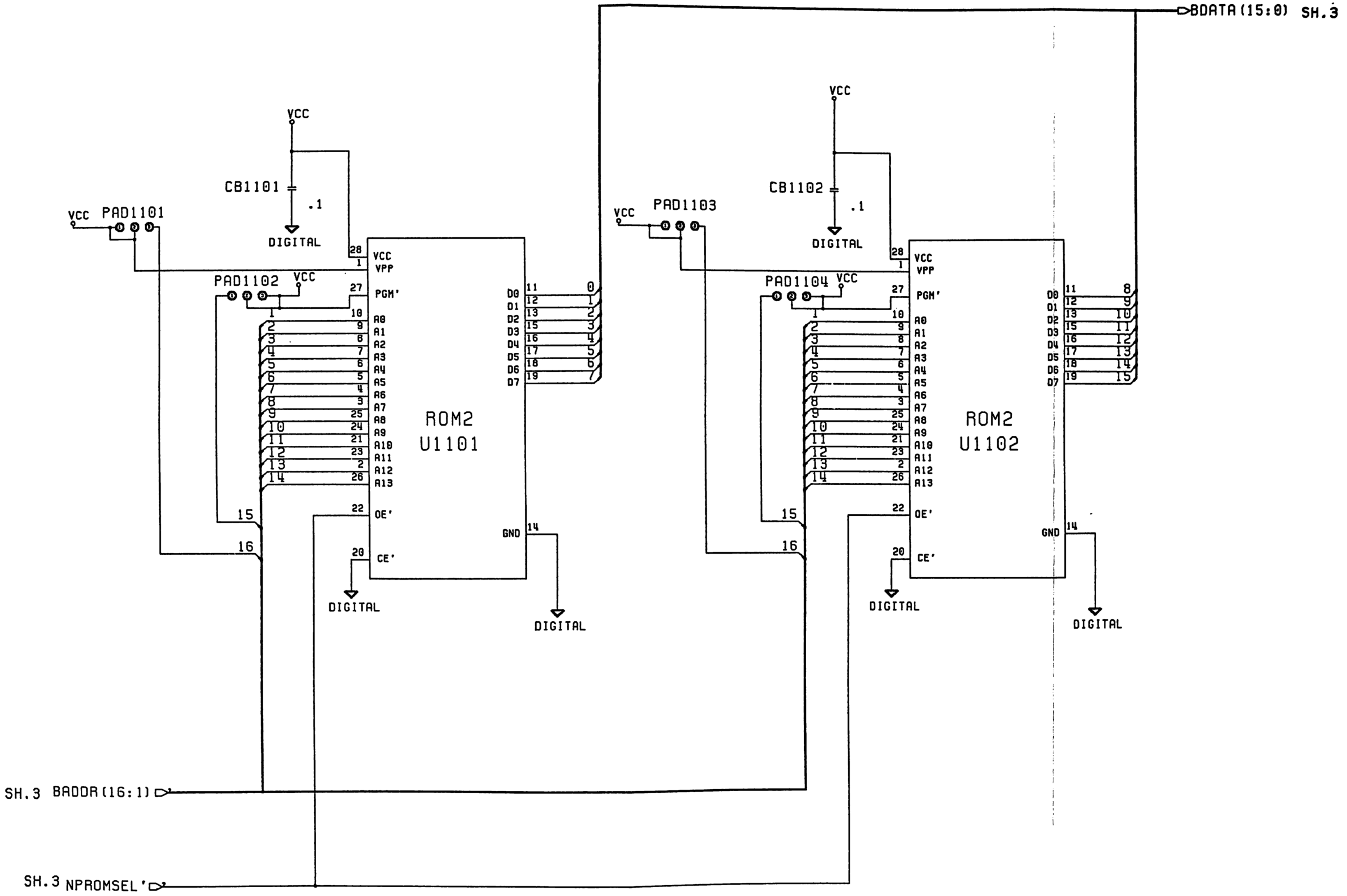
Schematic #313056, Rev. 8.1

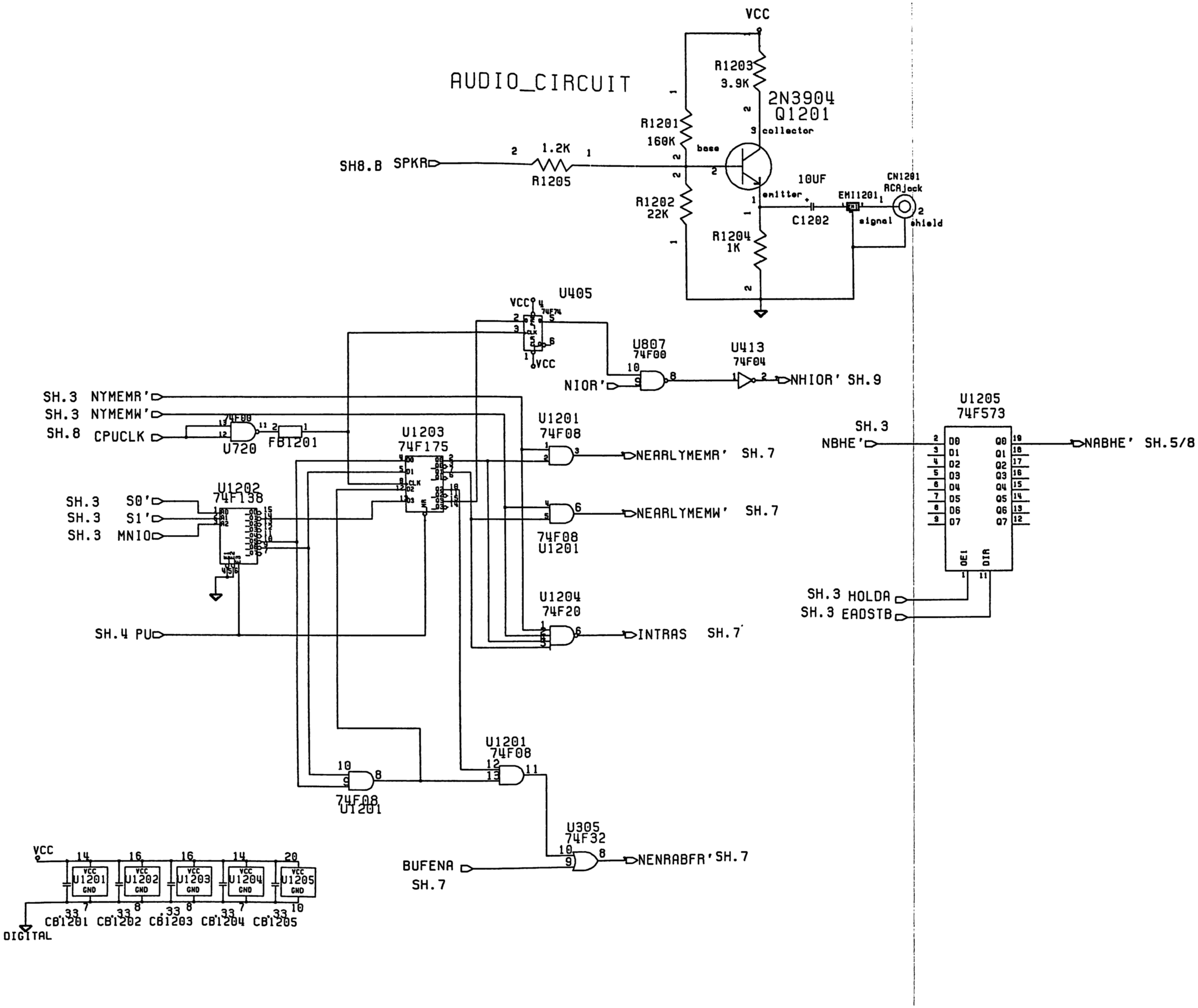
Sheet 9 of 13

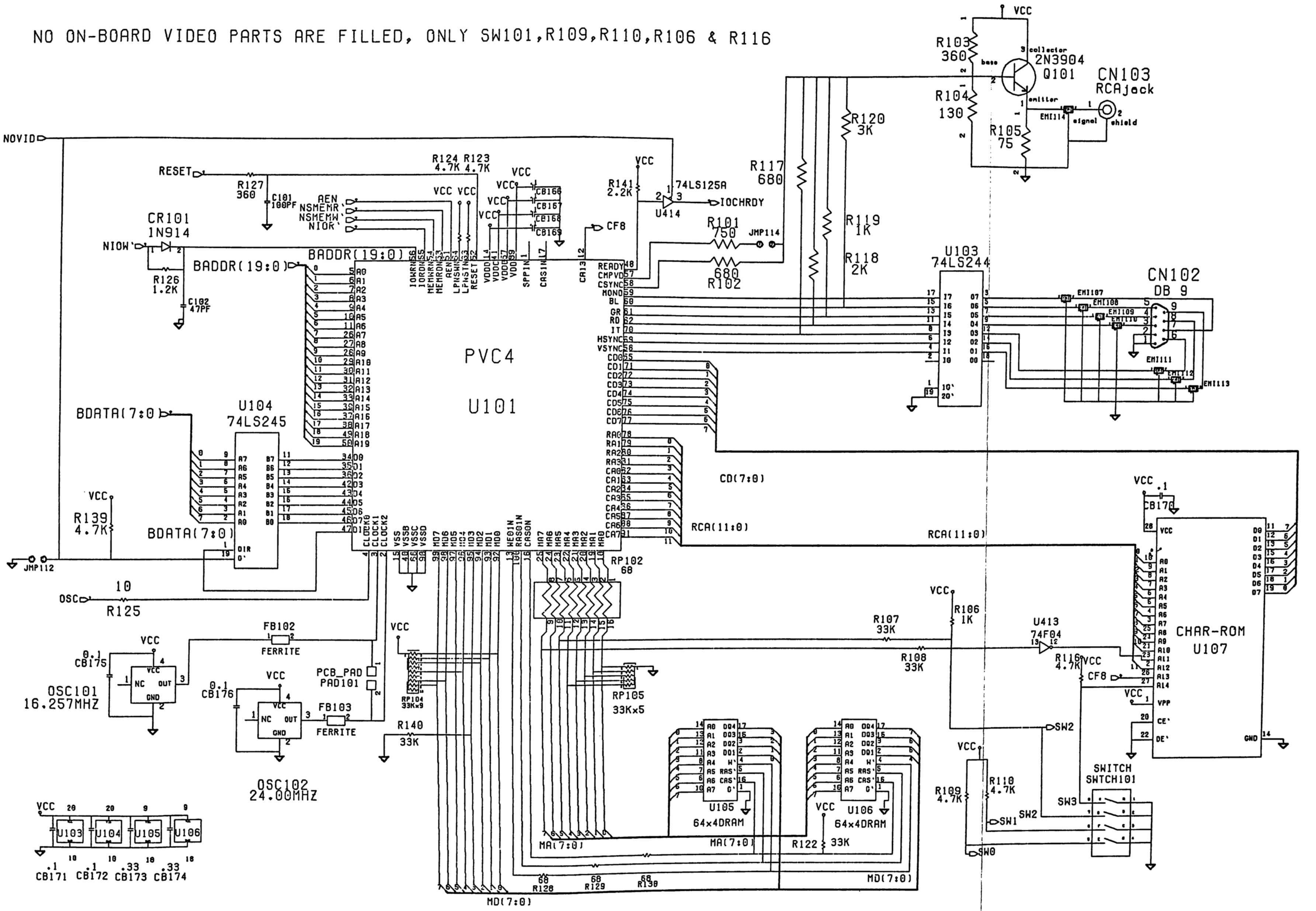



U905
PAL20L10B
BADDR(9:0)
AEN
VCC
R903
4.7K
JMP903
JMP904
R905
10K
R904
4.7K
IRQ14
ENABLEHD_LOW'
BDATA(7)
HD_DATA7
HD_IRQ14
SLAVE
DSKCHG'
NHDIO16
ENABLEHD_HIGH'
NHIOR'
NIOW'
ALE
NRESET'
BADDR(2)
BADDR(1)
BADDR(0)
U901
74LS244
VCC
220
R902
FB901
CN902
FB902
CN901
CS1'
CS0'
U902
74LS244
300
R907
VCC
R906
R901
4.7K
SLAVE
HD_IRQ14
NHDIO16
U903
74F245
BDATA(15)
BDATA(14)
BDATA(13)
BDATA(12)
BDATA(11)
BDATA(10)
BDATA(9)
BDATA(8)
DIR
G'
ENABLEHD_HIGH'
IOCHRDY
PAD901
PAD902
HD_DATA7
74LS04
U206
U904
74F245
BDATA(6)
BDATA(5)
BDATA(4)
BDATA(3)
BDATA(2)
BDATA(1)
BDATA(0)
ENABLEHD_LOW'
VCC
U901
U902
U903
U904
U905
.1
C8901
.1
C8902
.33
C8903
.33
C8904
.1
C8905

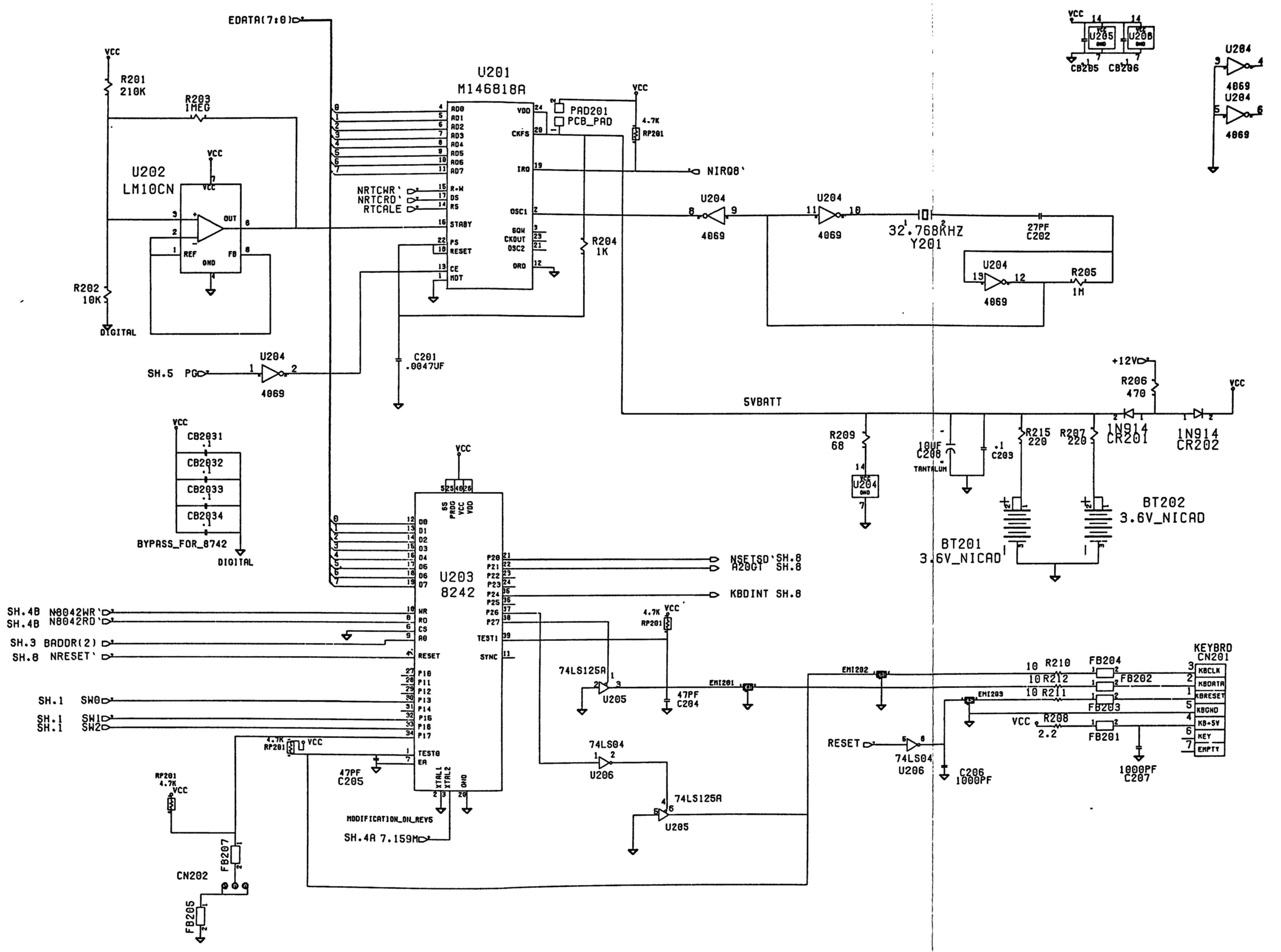

FMODE
IDX'
MS0'
FDS1'
FDS0'
MS1'
FDIRC'
FSTEP'
FWD'
FWG'
FTK0'
FWP'
FRDD'
FHS'
SH.9 DSKCHG'
CN1001
FLOPPY_DISK
VCC
R1002
4.7K
CB1001
.1
VCC
DRV
HS'
WE'
WD'
STEP'
DIRC'
PCVAL
DS1'
DS2'
MO1'
MO2'
RDD'
WP'
TR00'
IDX'
HDL'
RWC'
VSS
SH.5 DRQ2
SH.6 NLDORCS'
SH.6 NLDCRCS'
DMA
LDOR'
LDCR'
SH.5 NDACK2'
SH.4B TC
SH.3 NIOR'
SH.3 NIOW'
SH.6 FDCCS'
SH.3 BADDR(0)
DACK'
TC
RD'
WR'
CS'
A0
SH.6 IRQ6
IRQ
WD37C65
U1001
SH.6 IDATA(7:0)
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
CLK1
CLK2
RST
9.6MHZ
OSC1001
VCC
R1001
68
FB1001
LG_BEAD
SH.4A 16M
SH.4A 9.6M
SH.5 RESET
VCC
R1003
1K
PAD1002
PCB_PAD
PAD1001
PCB_PAD
PAD1004
PAD1005
VCC
150x5
RP1001
VCC
R1004
1K
PAD1003
PCB_PAD
FMODE
7406
U1002
R1006
150
R1005
150
VCC
74F00
U807
7406
U1002
VCC
U1002
CB1002


BDATA(15:0) SH.3
VCC
CB1101
.1
DIGITAL
PAD1101
PAD1102
VCC
VPP
PGM'
A0
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
OE'
CE'
D0
D1
D2
D3
D4
D5
D6
D7
GND
ROM2
U1101
CB1102
PAD1103
PAD1104
ROM2
U1102
SH.3 BADDR(16:1)
SH.3 NPROMSEL'


AUDIO_CIRCUIT
VCC
R1203
3.9K
2N3904
Q1201
collector
base
emitter
R1201
160K
R1202
22K
R1204
1K
SH8.B SPKR
1.2K
R1205
10UF
C1202
EM11201
CN1201
RCAjack
signal
shield
U405
74F74
VCC
U807
74F00
U413
74F04
NIOR'
NHIOR' SH.9
SH.3 NYMEMR'
SH.3 NYMEMW'
SH.8 CPUCLK
74F00
U720
FB1201
U1203
74F175
U1201
74F08
NEARLYMEMR' SH.7
NEARLYMEMW' SH.7
U1202
74F138
SH.3 S0'
SH.3 S1'
SH.3 MNIO
U1204
74F20
INTRAS SH.7
SH.4 PU
U1205
74F573
SH.3
NBHE'
NABHE' SH.5/8
SH.3 HOLDA
SH.3 EADSTB
U305
74F32
BUFENA
SH.7
NENRABFR' SH.7
VCC
CB1201 CB1202 CB1203 CB1204 CB1205
DIGITAL

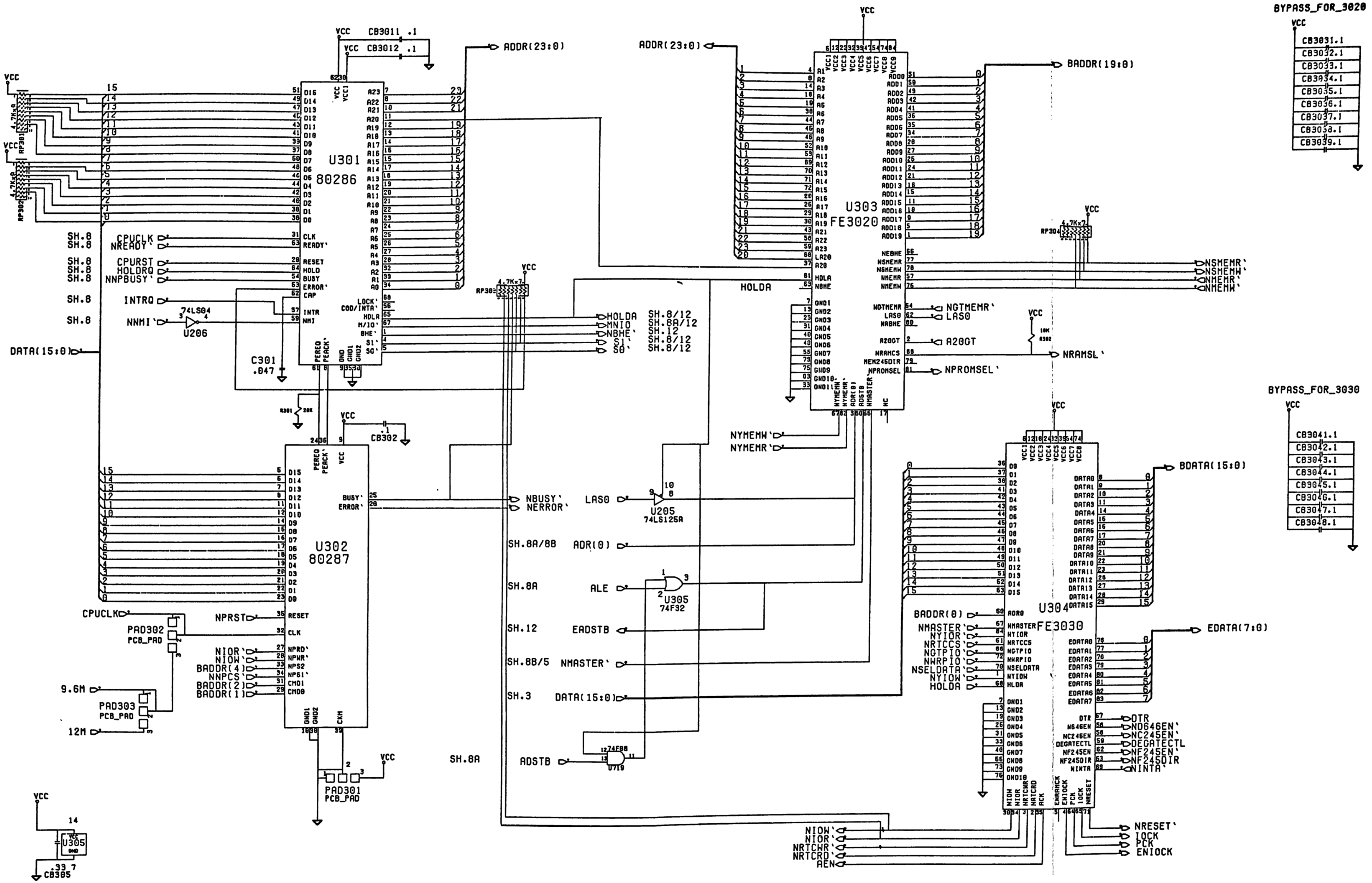


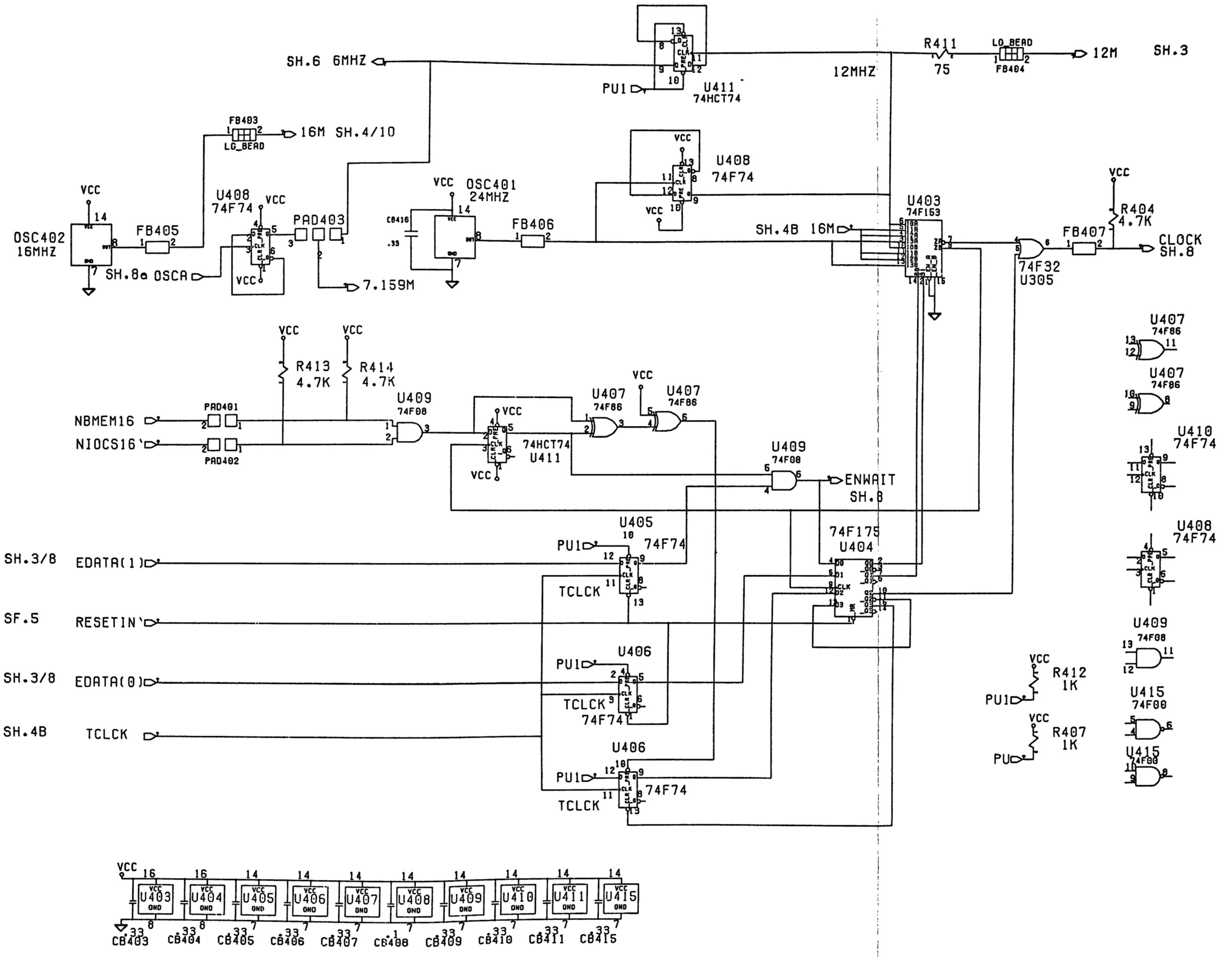
NO ON-BOARD VIDEO PARTS ARE FILLED, ONLY SW101,R109,R110,R106 & R116

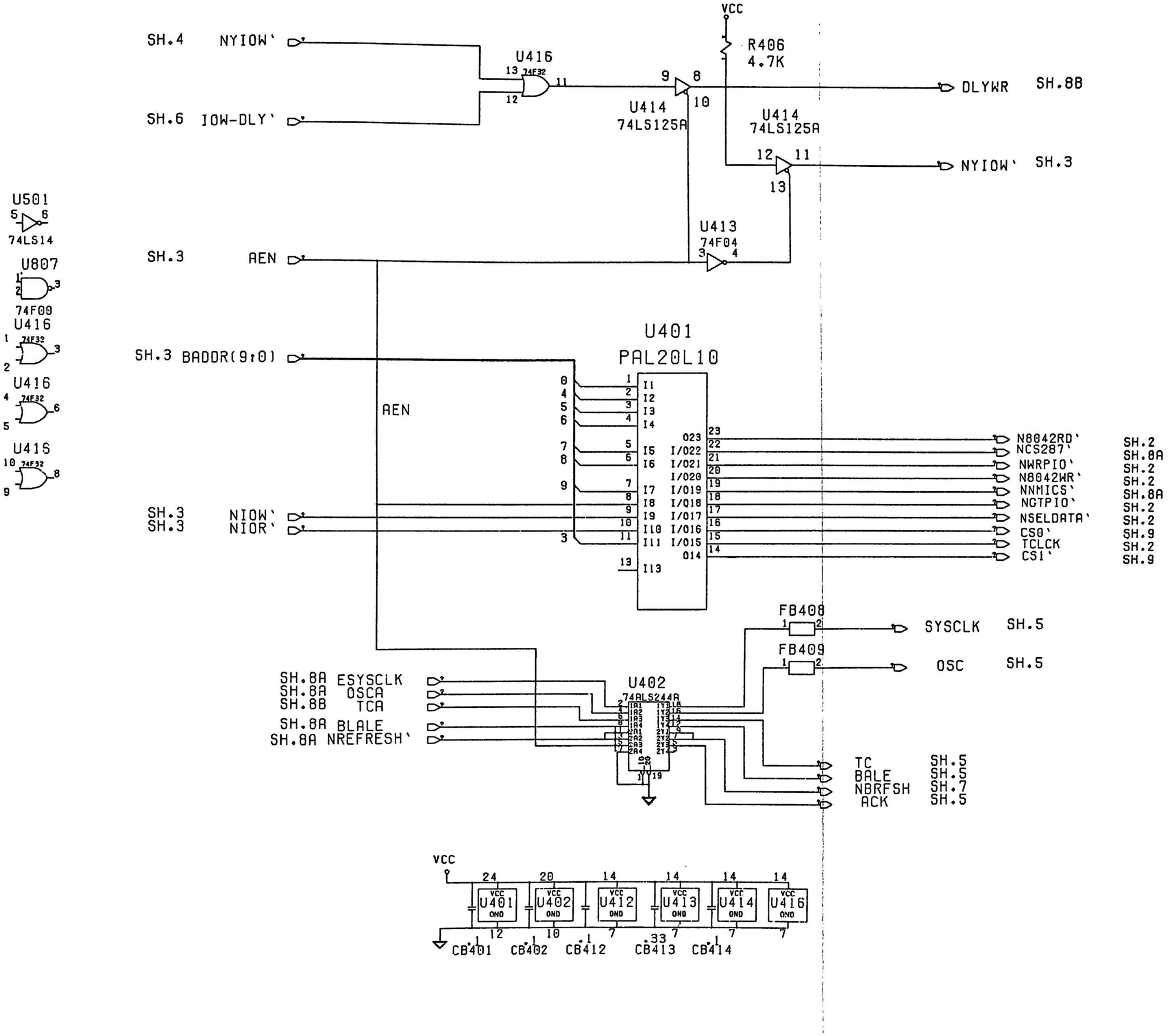

EDATA(7:0)
U201
M146818A
VCC
R201
210K
R203
1MEG
U202
LM10CN
R202
10K
DIGITAL
NRTCWR'
NRTCRD'
RTCALE
AD0
AD1
AD2
AD3
AD4
AD5
AD6
AD7
R-W
DS
AS
STBY
PS
RESET
CE
MOT
VDD
CKFS
IRQ
OSC1
SQW
CKOUT
OSC2
GND
PAD201
PCB_PAD
4.7K
RP201
NIRQ8'
R204
1K
C201
.0047UF
SH.5 PG
U204
4069
32.768KHZ
Y201
27PF
C202
R205
1M
+12V
R206
470
5VBATT
R209
68
10UF
C208
TANTALUM
.1
C203
R215
220
R207
220
1N914
CR201
1N914
CR202
BT201
3.6V_NICAD
BT202
3.6V_NICAD
CB205
CB206
U205
U206
CB2031
CB2032
CB2033
CB2034
BYPASS_FOR_8742
U203
8242
D0
D1
D2
D3
D4
D5
D6
D7
WR
RD
CS
A0
RESET
P10
P11
P12
P13
P14
P15
P16
P17
TEST0
EA
XTAL1
XTAL2
GND
SS
PROG
VCC
VDD
P20
P21
P22
P23
P24
P25
P26
P27
TEST1
SYNC
NSETSD' SH.8
A20GT SH.8
KBDINT SH.8
SH.4B N8042WR'
SH.4B N8042RD'
SH.3 BADDR(2)
SH.8 NRESET'
SH.1 SW0
SH.1 SW1
SH.1 SW2
47PF
C205
MODIFICATION_ON_REV5
SH.4A 7.159M
74LS125A
U205
47PF
C204
74LS04
U206
74LS125A
U205
EMI201
EMI202
EMI203
RESET
74LS04
U206
C206
1000PF
R210
10
R212
10
R211
10
R208
2.2
FB204
FB202
FB203
FB201
1000PF
C207
KEYBRD
CN201
KBCLK
KBDATA
KBRESET
KBGND
KB+5V
KEY
EMPTY
RP201
4.7K
FB207
CN202
FB205

Schematic #313236, Rev. 1.4

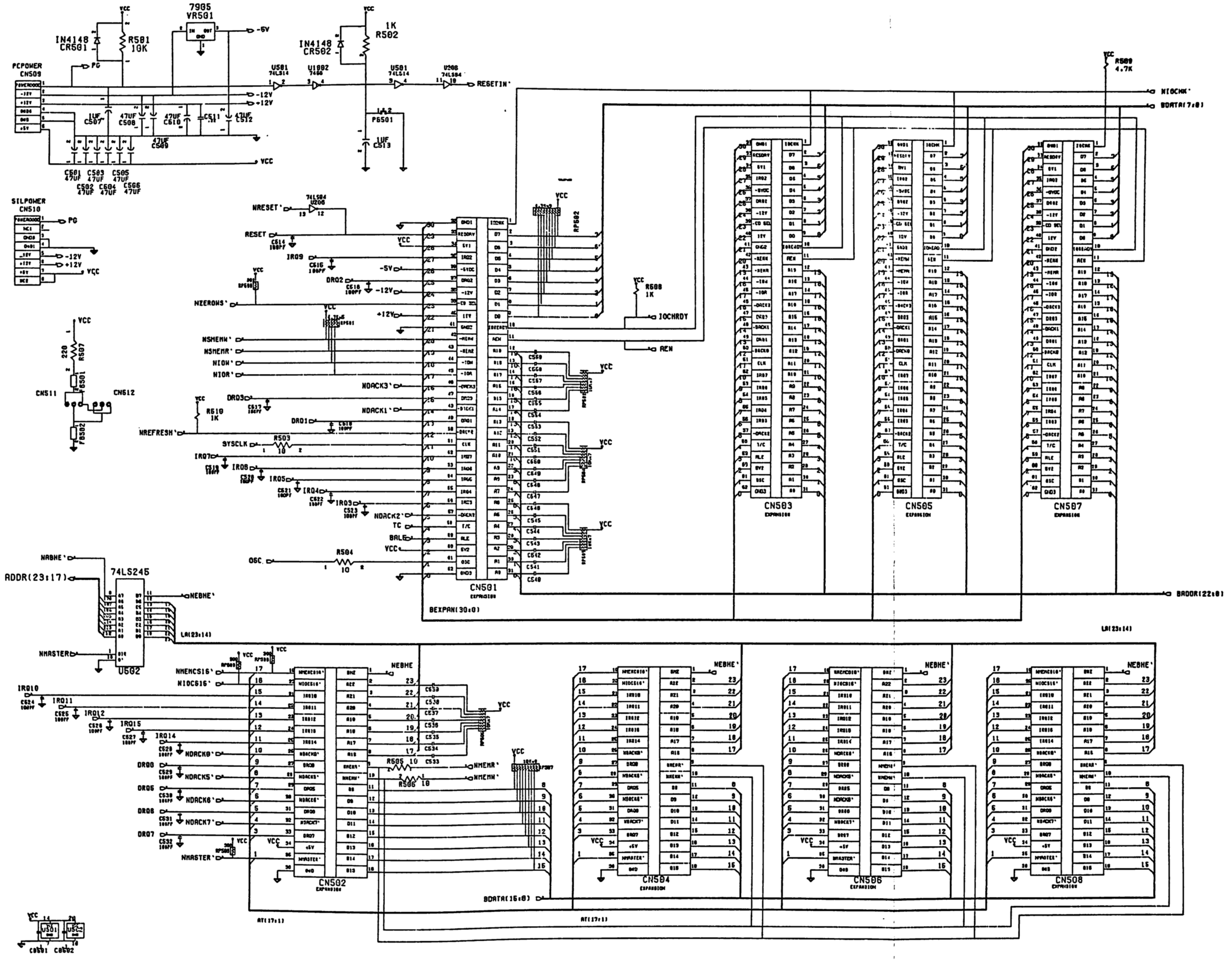
Sheet 3 of 12

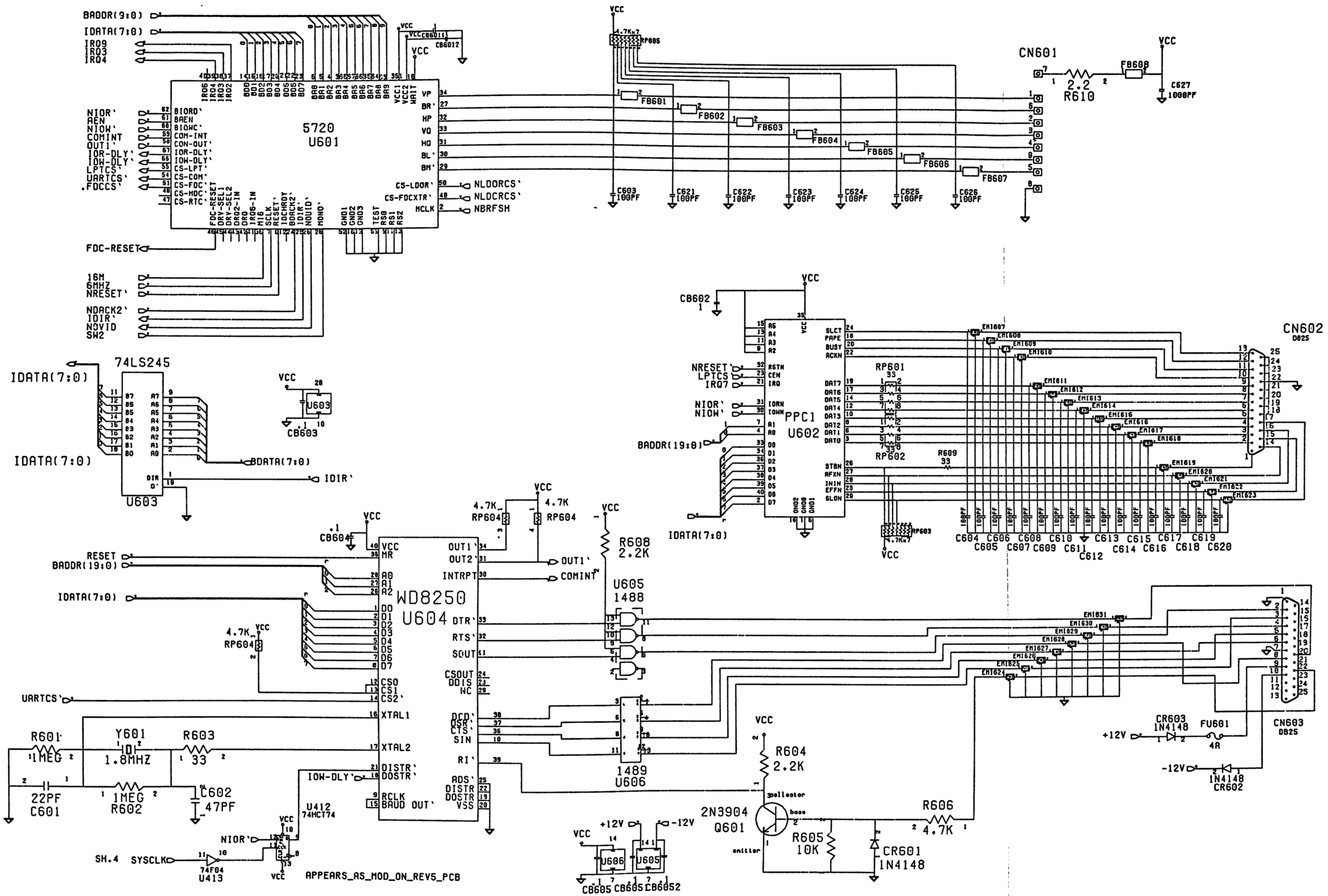


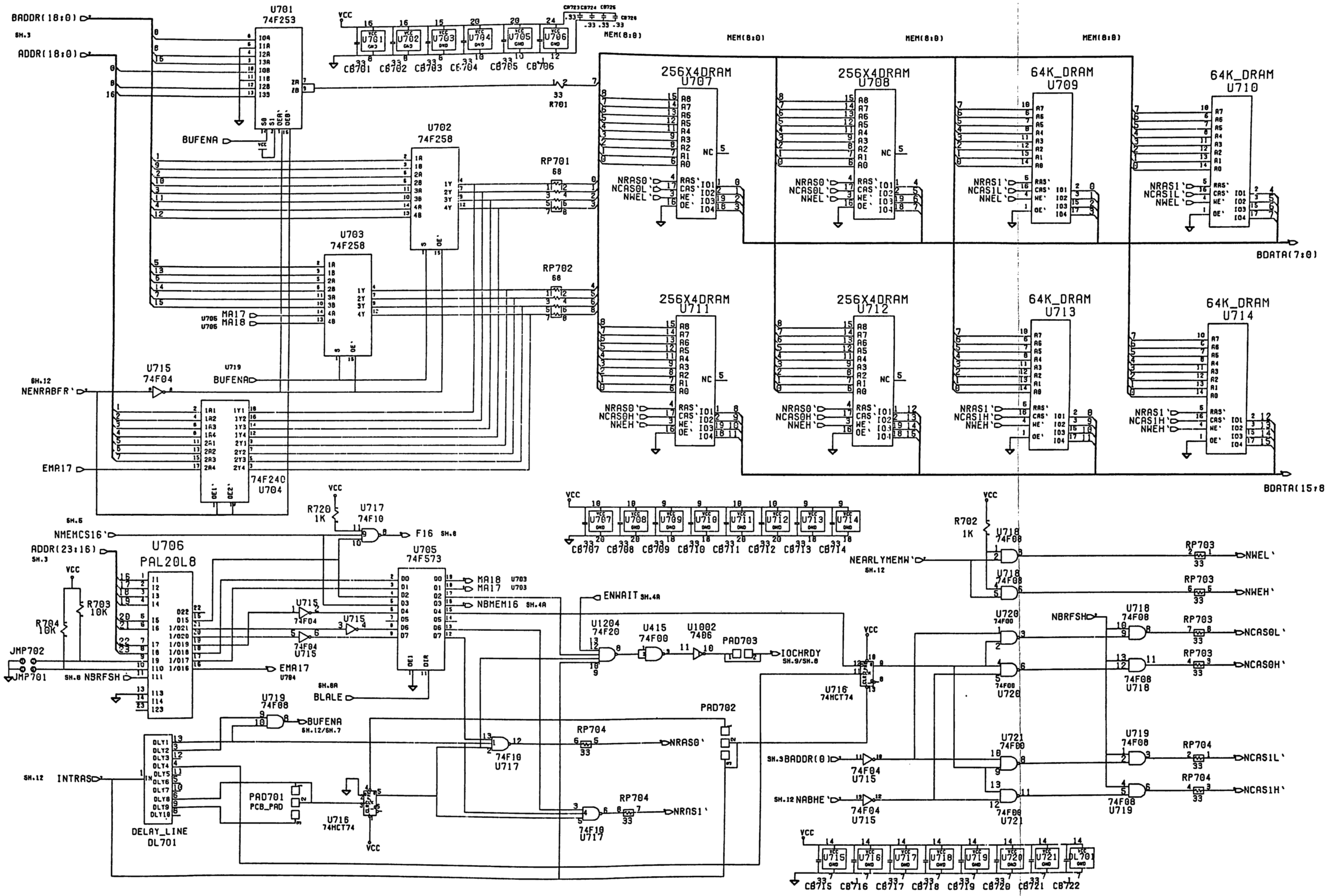

SH.6 6MHZ
U411
74HCT74
PU1
12MHZ
R411
75
LG_BEAD
FB404
12M
SH.3
FB403
LG_BEAD
16M SH.4/10
U408
74F74
VCC
OSC402
16MHZ
FB405
SH.8a OSCA
PAD403
7.159M
OSC401
24MHZ
CB416
.33
FB406
SH.4B 16M
U403
74F163
R404
4.7K
FB407
CLOCK
SH.8
74F32
U305
U407
74F86
U410
74F74
R413
4.7K
R414
4.7K
U409
74F08
NBMEM16
NIOCS16`
PAD401
PAD402
74HCT74
U411
ENWAIT
SH.8
SH.3/8
EDATA(1)
U405
74F74
TCLCK
74F175
U404
SF.5
RESETIN`
U406
EDATA(0)
SH.4B
TCLCK
R412
1K
R407
1K
PU
U415
74F00
U403
U404
U405
U406
U407
U408
U409
U410
U411
U415
CB403
CB404
CB405
CB406
CB407
CB408
CB409
CB410
CB411
CB415


VCC
SH.4 NYIOW'
SH.6 IOW-DLY'
U416
74F32
13
12
11
9
8
10
U414
74LS125A
R406
4.7K
DLYWR SH.8B
U414
74LS125A
12
11
13
NYIOW' SH.3
U501
5
6
74LS14
U807
74F09
U416
74F32
U416
74F32
U416
74F32
SH.3 AEN
U413
74F04
3
4
SH.3 BADDR(9:0)
AEN
U401
PAL20L10
I1
I2
I3
I4
I5
I6
I7
I8
I9
I10
I11
I13
O23
I/O22
I/O21
I/O20
I/O19
I/O18
I/O17
I/O16
I/O15
O14
N8042RD' SH.2
NCS287' SH.8A
NWRPIO' SH.2
N8042WR' SH.2
NNMICS' SH.8A
NGTPIO' SH.2
NSELDATA' SH.2
CS0' SH.9
TCLCK SH.2
CS1' SH.9
SH.3 NIOW'
SH.3 NIOR'
FB408
SYSCLK SH.5
FB409
OSC SH.5
SH.8A ESYSCLK
SH.8A OSCA
SH.8B TCA
SH.8A BLALE
SH.8A NREFRESH'
U402
74ALS244A
TC SH.5
BALE SH.5
NBRFSH SH.7
ACK SH.5
VCC
U401
U402
U412
U413
U414
U416
24
20
14
14
14
14
12
10
7
7
7
7
.1
.1
.1
.33
.1
CB401
CB402
CB412
CB413
CB414

Schematic #313236, Rev. 1.4
Sheet 5 of 12

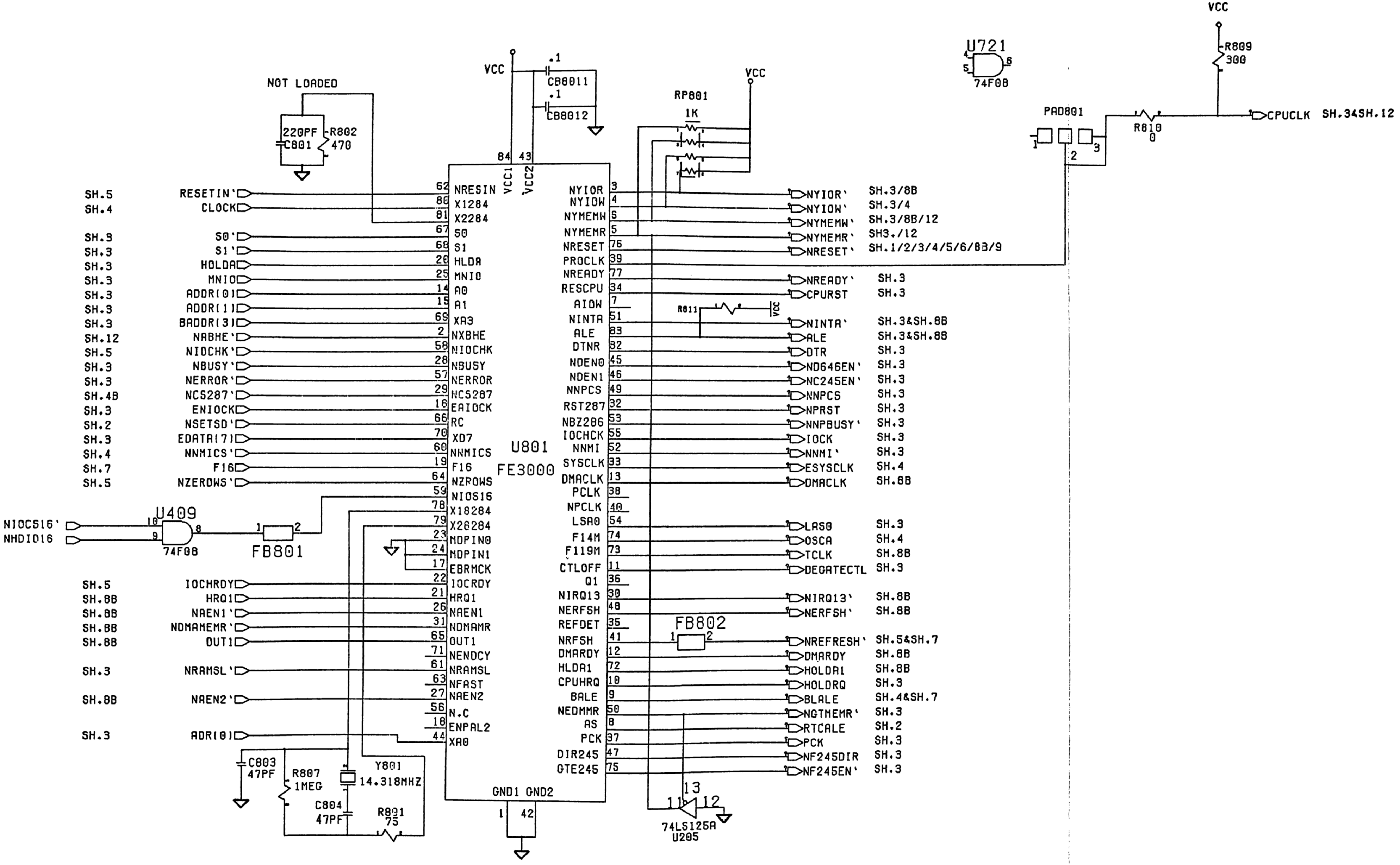


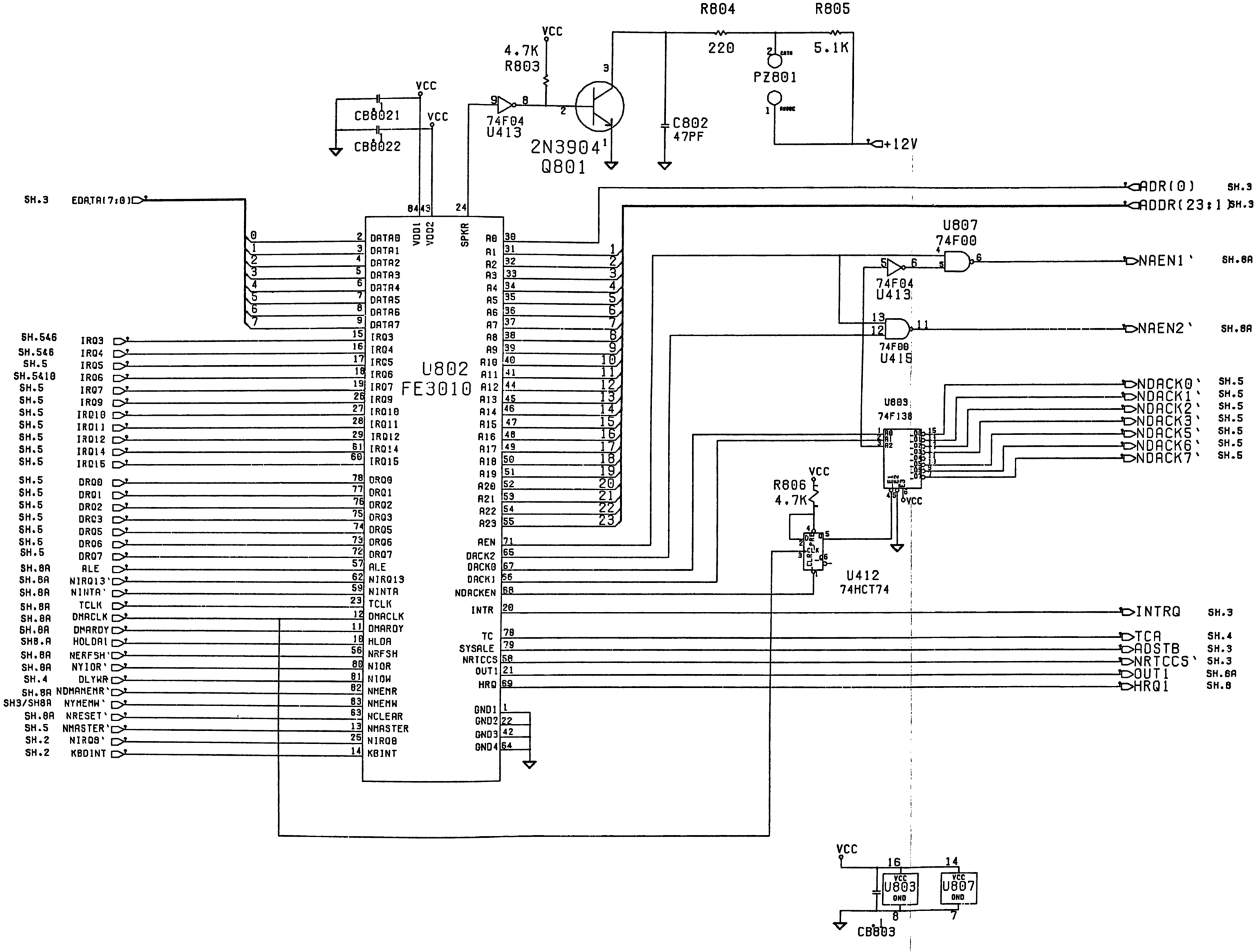

BADDR(9:0)
IDATA(7:0)
IRQ9
IRQ3
IRQ4
VCC
CB6011
CB6012
5720
U601
NIOR'
AEN
NIOW'
COMINT
OUT1'
IOR-DLY'
IOW-DLY'
LPTCS'
UARTCS'
FDCCS'
BIORD'
BAEN
BIOWC'
COM-INT
COM-OUT'
IOR-DLY'
IOW-DLY'
CS-LPT'
CS-COM'
CS-FDC'
CS-HDC'
CS-RTC'
VP
BR'
HP
VQ
HQ
BL'
BM'
CS-LDOR'
CS-FDCXTR'
MCLK
NLDORCS'
NLDCRCS'
NBRFSH
FDC-RESET
16M
6MHZ
NRESET'
NDACK2'
IDIR'
NOVID
SW2
RP605
4.7Kx7
FB601
FB602
FB603
FB604
FB605
FB606
FB607
FB608
C603 100PF
C621 100PF
C622 100PF
C623 100PF
C624 100PF
C625 100PF
C626 100PF
CN601
R610
2.2
C627 1000PF
74LS245
U603
IDATA(7:0)
BDATA(7:0)
IDIR'
CB603
CB602
PPC1
U602
NRESET'
LPTCS'
IRQ7
NIOR'
NIOW'
BADDR(19:0)
IDATA(7:0)
RP601
RP602
RP603
R609
33
CN602
DB25
EMI607
EMI608
EMI609
EMI610
EMI611
EMI612
EMI613
EMI614
EMI615
EMI616
EMI617
EMI618
EMI619
EMI620
EMI621
EMI622
EMI623
C604 C605 C606 C607 C608 C609 C610 C611 C612 C613 C614 C615 C616 C617 C618 C619 C620
RESET
BADDR(19:0)
IDATA(7:0)
UARTCS'
CB604
RP604
4.7K
WD8250
U604
MR
A0 A1 A2
D0 D1 D2 D3 D4 D5 D6 D7
CS0 CS1 CS2'
XTAL1
XTAL2
DISTR'
DOSTR'
RCLK
BAUD OUT'
OUT1'
OUT2'
INTRPT
DTR'
RTS'
SOUT
CSOUT
DDIS
NC
DCD'
DSR'
CTS'
SIN
RI'
ADS'
DISTR
DOSTR
VSS
OUT1'
COMINT'
R608
2.2K
U605
1488
1489
U606
EMI624
EMI625
EMI626
EMI627
EMI628
EMI629
EMI630
EMI631
CN603
DB25
CR603
1N4148
FU601
4A
+12V
-12V
CR602
1N4148
R601
1MEG
Y601
1.8MHZ
R603
33
22PF
C601
1MEG
R602
C602
47PF
IOW-DLY'
U412
74HCT74
NIOR'
SH.4
SYSCLK
74F04
U413
APPEARS_AS_MOD_ON_REV5_PCB
CB605 CB605 CB6052
R604
2.2K
2N3904
Q601
collector
base
emitter
R605
10K
CR601
1N4148
R606
4.7K

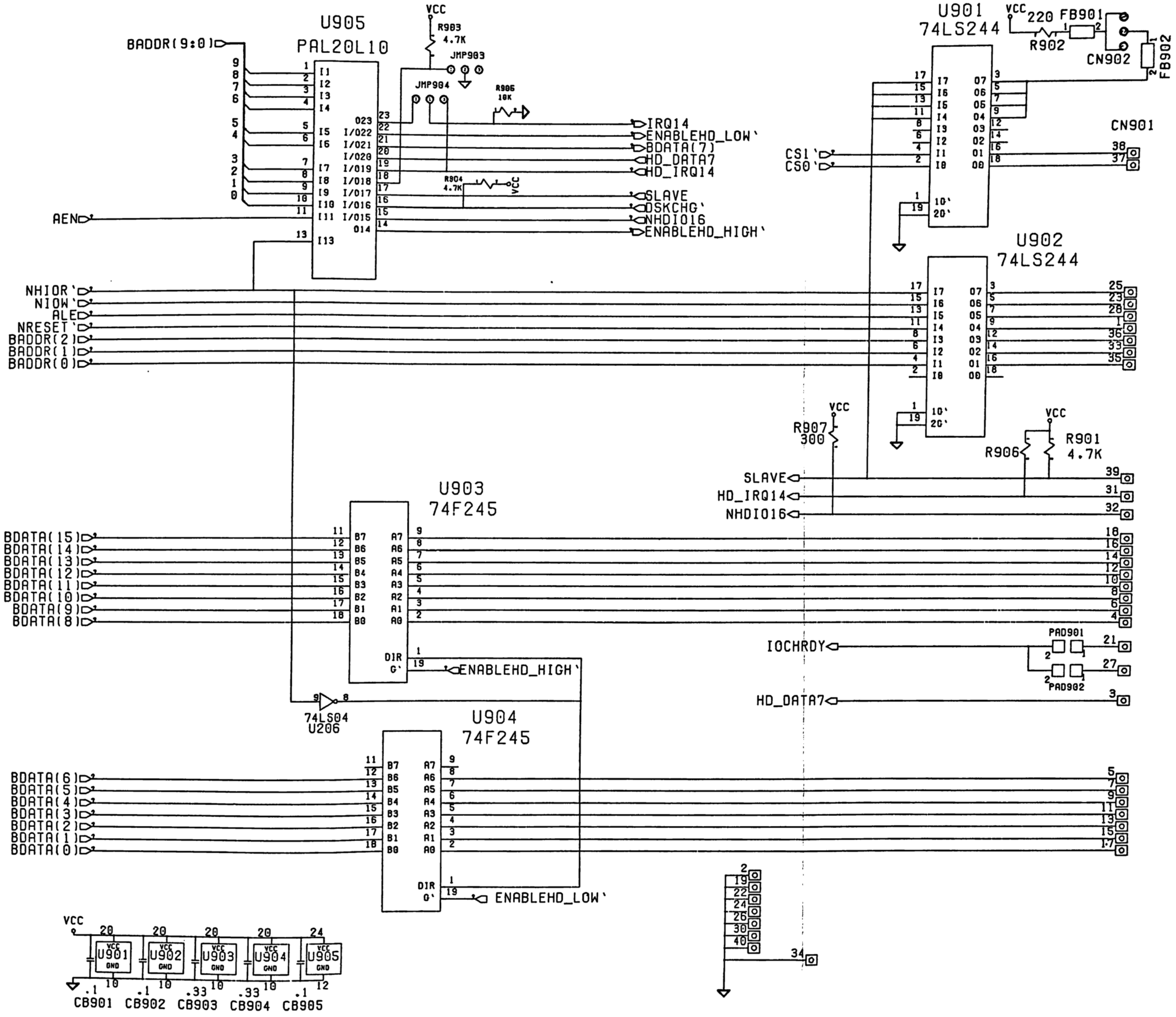

BADDR(18:0)
SH.3
ADDR(18:0)
U701
74F253
BUFENA
U702
74F258
U703
74F258
U705 MA17
U705 MA18
U715
74F04
U719
SH.12
NENRABFR'
EMA17
74F240
U704
VCC
U701 U702 U703 U704 U705 U706
C8701 C8702 C8703 C8704 C8705 C8706
C8723 C8724 C8725 C8726
MEM(8:0)
33
R701
RP701
68
RP702
68
256X4DRAM
U707
256X4DRAM
U708
64K_DRAM
U709
64K_DRAM
U710
256X4DRAM
U711
256X4DRAM
U712
64K_DRAM
U713
64K_DRAM
U714
NRAS0'
NCAS0L'
NWEL'
NRAS1'
NCAS1L'
NCAS0H'
NWEH'
NCAS1H'
NC
BDATA(7:0)
BDATA(15:8)
U707 U708 U709 U710 U711 U712 U713 U714
C8707 C8708 C8709 C8710 C8711 C8712 C8713 C8714
R720
1K
U717
74F10
F16 SH.8
SH.6
NMEMCS16'
ADDR(23:16)
SH.3
U706
PAL20L8
R703
10K
R704
10K
JMP702
JMP701
SH.8 NBRFSH
U705
74F573
MA18 U703
MA17 U703
NBMEM16 SH.4A
ENWAIT SH.4A
EMA17 U704
SH.6A
BLALE
U1204
74F20
U415
74F00
U1002
7406
PAD703
IOCHRDY SH.9/SH.8
U716
74HCT74
R702
1K
U718
74F08
NEARLYMEMW'
SH.12
RP703
33
NWEL'
NWEH'
U720
74F00
NBRFSH
NCAS0L'
NCAS0H'
U719
74F08
BUFENA SH.12/SH.7
PAD702
RP704
NRAS0'
NRAS1'
SH.12
INTRAS
DLY1 DLY2 DLY3 DLY4 DLY5 DLY6 DLY7 DLY8 DLY9 DLY10
DELAY_LINE
DL701
PAD701
PCB_PAD
U721
74F00
SH.3 BADDR(0)
SH.12 NABHE'
NCAS1L'
NCAS1H'
U715 U716 U717 U718 U719 U720 U721 DL701
C8715 C8716 C8717 C8718 C8719 C8720 C8721 C8722

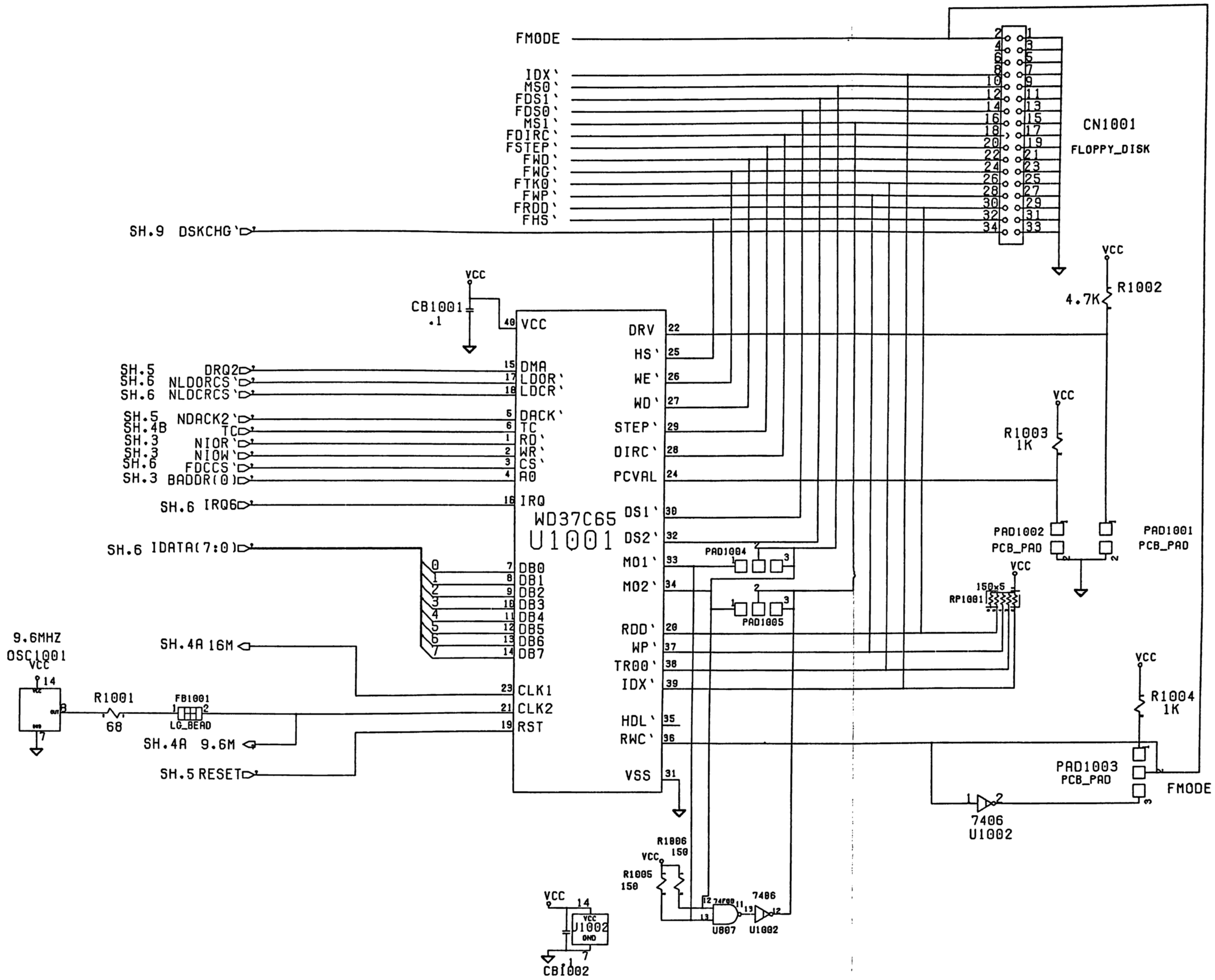
Schematic #313236, Rev. 1.4

Sheet 8 of 12

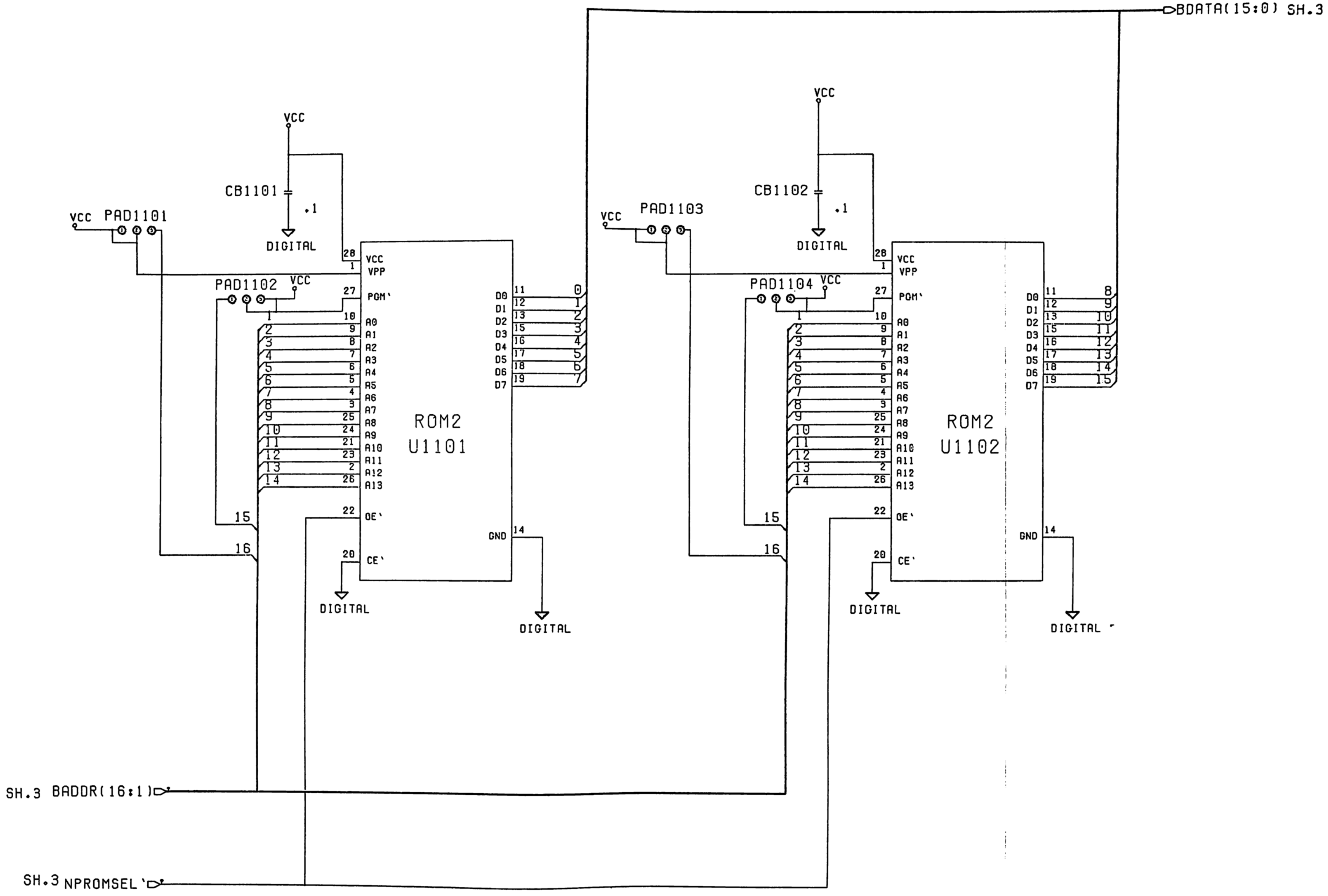


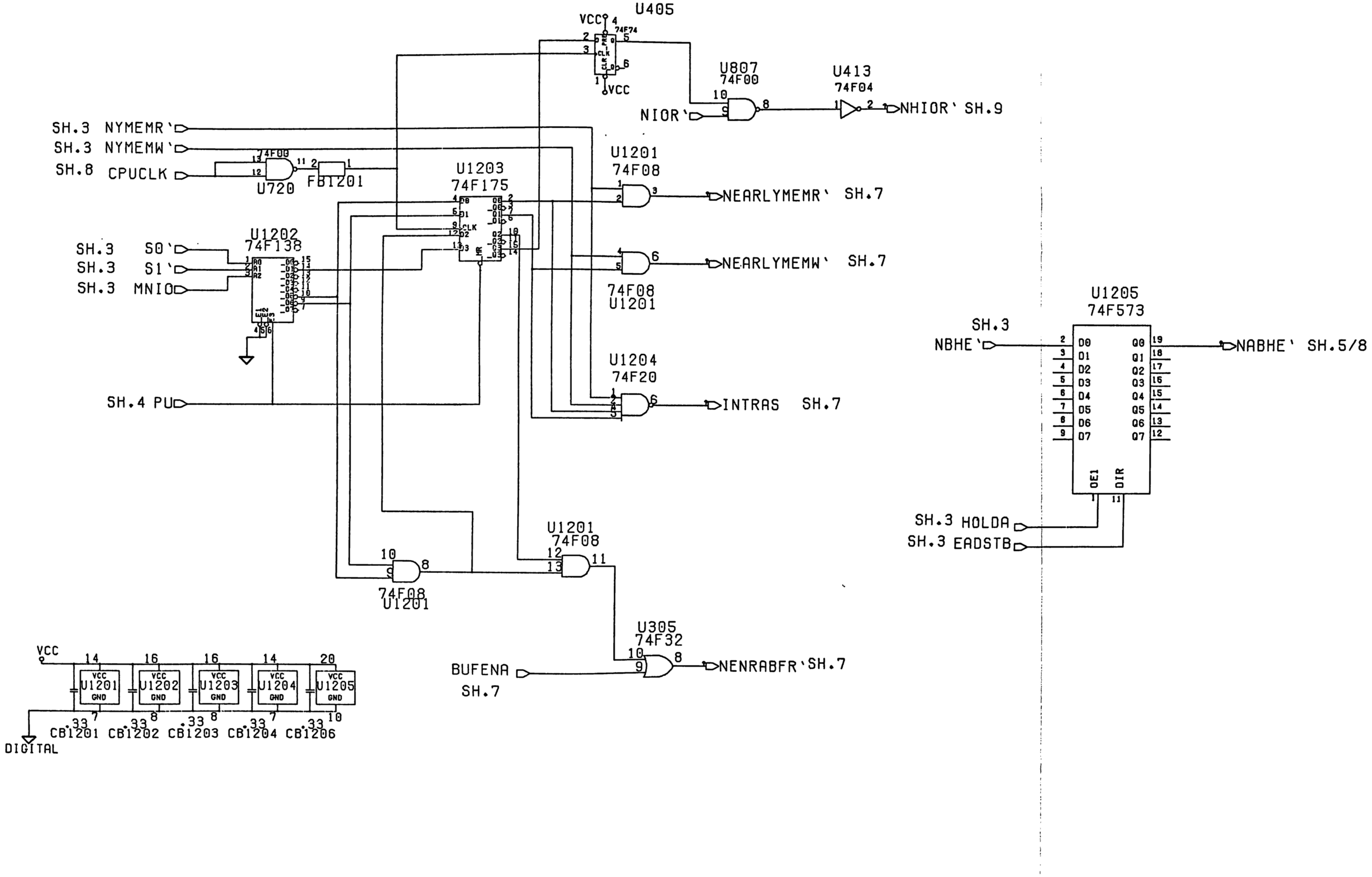

R804
R805
VCC
4.7K
R803
220
5.1K
PZ801
CB8021
CB8022
VCC
9
8
74F04
U413
2N3904
Q801
C802
47PF
+12V
SH.3
EDATA(7:0)
ADR(0) SH.3
ADDR(23:1) SH.3
U807
74F00
NAEN1' SH.8A
NAEN2' SH.8A
74F04
U413
74F00
U415
U802
FE3010
VDD1
VDD2
SPKR
DATA0
DATA1
DATA2
DATA3
DATA4
DATA5
DATA6
DATA7
SH.5&6 IRQ3
SH.5&6 IRQ4
SH.5 IRQ5
SH.5&10 IRQ6
SH.5 IRQ7
SH.5 IRQ9
SH.5 IRQ10
SH.5 IRQ11
SH.5 IRQ12
SH.5 IRQ14
SH.5 IRQ15
SH.5 DRQ0
SH.5 DRQ1
SH.5 DRQ2
SH.5 DRQ3
SH.5 DRQ5
SH.5 DRQ6
SH.5 DRQ7
SH.8A ALE
SH.8A NIRQ13'
SH.8A NINTA'
SH.8A TCLK
SH.8A DMACLK
SH.8A DMARDY
SH8.A HOLDA1
SH.8A NERFSH'
SH.8A NYIOR'
SH.4 DLYWR
SH.8A NDMAMEMR'
SH3/SH8A NYMEMW'
SH.8A NRESET'
SH.5 NMASTER'
SH.2 NIRQ8'
SH.2 KBDINT
HLDA
NRFSH
NIOR
NIOW
NMEMR
NMEMW
NCLEAR
NMASTER
NIRQ8
KBINT
A0–A23
AEN
DACK2
DACK0
DACK1
NDACKEN
INTR
TC
SYSALE
NRTCCS
OUT1
HRQ
GND1
GND2
GND3
GND4
U803
74F138
NDACK0' SH.5
NDACK1' SH.5
NDACK2' SH.5
NDACK3' SH.5
NDACK5' SH.5
NDACK6' SH.5
NDACK7' SH.5
R806
4.7K
VCC
U412
74HCT74
INTRQ SH.3
TCA SH.4
ADSTB SH.3
NRTCCS' SH.3
OUT1 SH.8A
HRQ1 SH.8
VCC
16
14
U803
U807
8
7
CB803


U905
PAL20L10
BADDR(9:0)
AEN
VCC
R903 4.7K
JMP903
JMP904
R905 10K
R904 4.7K
IRQ14
ENABLEHD_LOW`
BDATA(7)
HD_DATA7
HD_IRQ14
SLAVE
DSKCHG`
NHDIO16
ENABLEHD_HIGH`
U901
74LS244
220 R902
FB901
CN902
FB902
CN901
CS1`
CS0`
U902
74LS244
NHIOR`
NIOW`
ALE
NRESET`
BADDR(2)
BADDR(1)
BADDR(0)
R907 300
R906
R901 4.7K
SLAVE
HD_IRQ14
NHDIO16
U903
74F245
BDATA(15)
BDATA(14)
BDATA(13)
BDATA(12)
BDATA(11)
BDATA(10)
BDATA(9)
BDATA(8)
ENABLEHD_HIGH`
IOCHRDY
PAD901
PAD902
HD_DATA7
74LS04
U206
U904
74F245
BDATA(6)
BDATA(5)
BDATA(4)
BDATA(3)
BDATA(2)
BDATA(1)
BDATA(0)
ENABLEHD_LOW`
U901 U902 U903 U904 U905
.1 .1 .33 .33 .1
CB901 CB902 CB903 CB904 CB905


FMODE
IDX`
MS0`
FDS1`
FDS0`
MS1`
FDIRC`
FSTEP`
FWD`
FWG`
FTK0`
FWP`
FRDD`
FHS`
SH.9 DSKCHG`
CN1001
FLOPPY_DISK
VCC
CB1001
.1
VCC
DRV
HS`
WE`
WD`
STEP`
DIRC`
PCVAL
DS1`
DS2`
MO1`
MO2`
RDD`
WP`
TR00`
IDX`
HDL`
RWC`
VSS
SH.5 DRQ2
SH.6 NLDORCS`
SH.6 NLDCRCS`
DMA
LDOR`
LDCR`
SH.5 NDACK2`
SH.4B TC
SH.3 NIOR`
SH.3 NIOW`
SH.6 FDCCS`
SH.3 BADDR(0)
DACK`
TC
RD`
WR`
CS`
A0
SH.6 IRQ6
IRQ
WD37C65
U1001
SH.6 IDATA(7:0)
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
9.6MHZ
OSC1001
VCC
SH.4A 16M
CLK1
R1001
68
FB1001
LG_BEAD
CLK2
SH.4A 9.6M
RST
SH.5 RESET
4.7K
R1002
R1003
1K
PAD1002
PCB_PAD
PAD1001
PCB_PAD
PAD1004
PAD1005
150x5
RP1001
R1004
1K
PAD1003
PCB_PAD
FMODE
7406
U1002
R1006
150
R1005
150
74F08
U807
7406
U1002
VCC
U1002
CB1002

Schematic #313236, Rev. 1.4
Sheet 11 of 12




U405
VCC
74F74
VCC
U807
74F00
U413
74F04
NIOR'
NHIOR' SH.9
SH.3 NYMEMR'
SH.3 NYMEMW'
SH.8 CPUCLK
74F00
U720
FB1201
U1203
74F175
U1201
74F08
NEARLYMEMR' SH.7
NEARLYMEMW' SH.7
74F08
U1201
U1202
74F138
SH.3 S0'
SH.3 S1'
SH.3 MNIO
SH.4 PU
U1204
74F20
INTRAS SH.7
U1205
74F573
SH.3
NBHE'
NABHE' SH.5/8
D0
D1
D2
D3
D4
D5
D6
D7
Q0
Q1
Q2
Q3
Q4
Q5
Q6
Q7
OE1
DIR
SH.3 HOLDA
SH.3 EADSTB
U1201
74F08
74F08
U1201
U305
74F32
BUFENA
SH.7
NENRABFR' SH.7
VCC
U1201
U1202
U1203
U1204
U1205
GND
.33
CB1201
CB1202
CB1203
CB1204
CB1206
DIGITAL

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Computer Systems Division
1200 Wilson Drive
West Chester, PA 19380